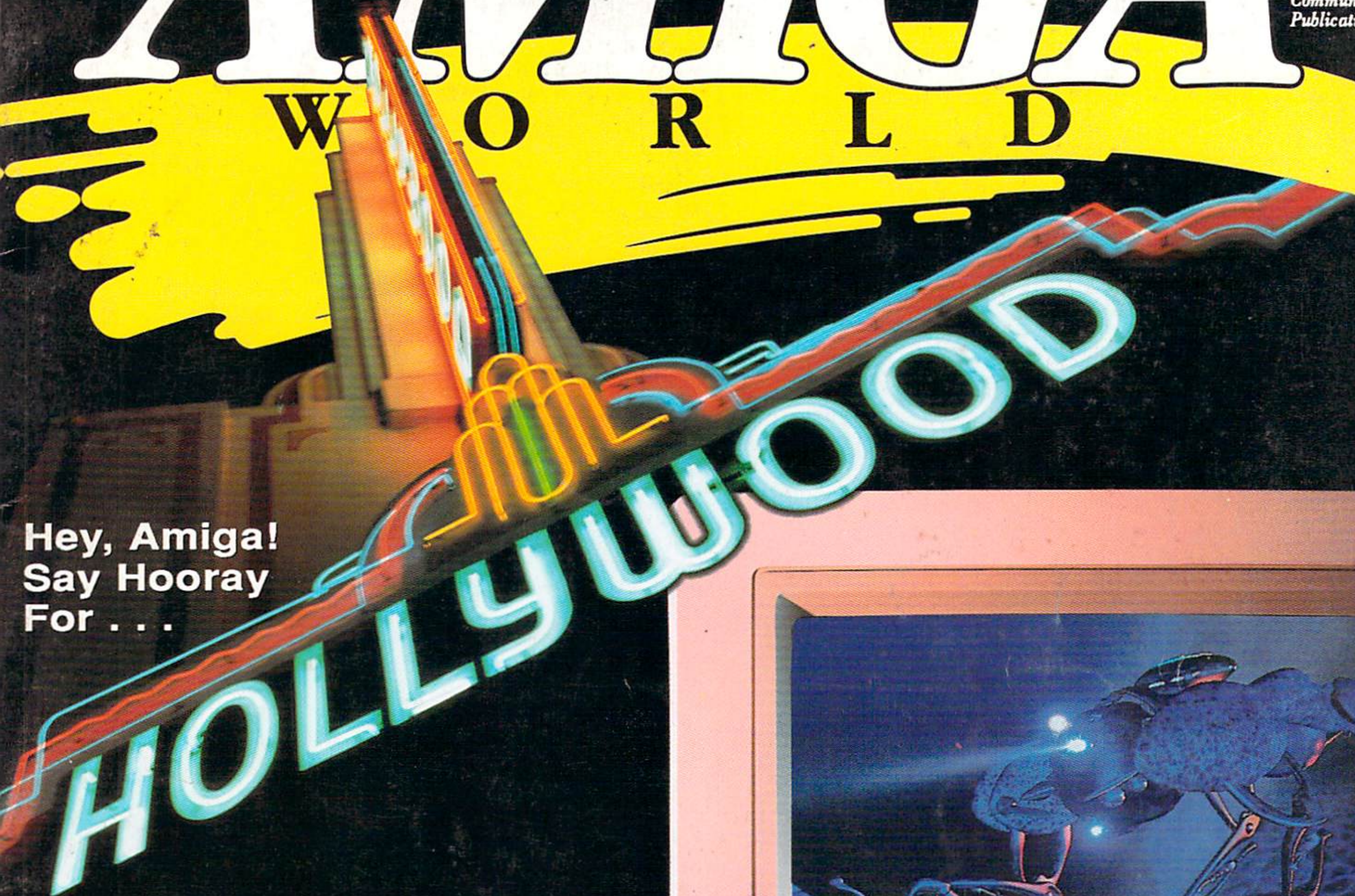
AMIGA WORLD

November 1993
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An IDG Communications Publication

Hey, Amiga!
Say Hooray
For . . .



Prime Time Animation!

Amiga Effects Sweep The Movies & TV—p.43

And You Can Do It, Too!

- 6 Top 3-D Anim Packages
- High-Quality Playback —*Without Single-Framing!*
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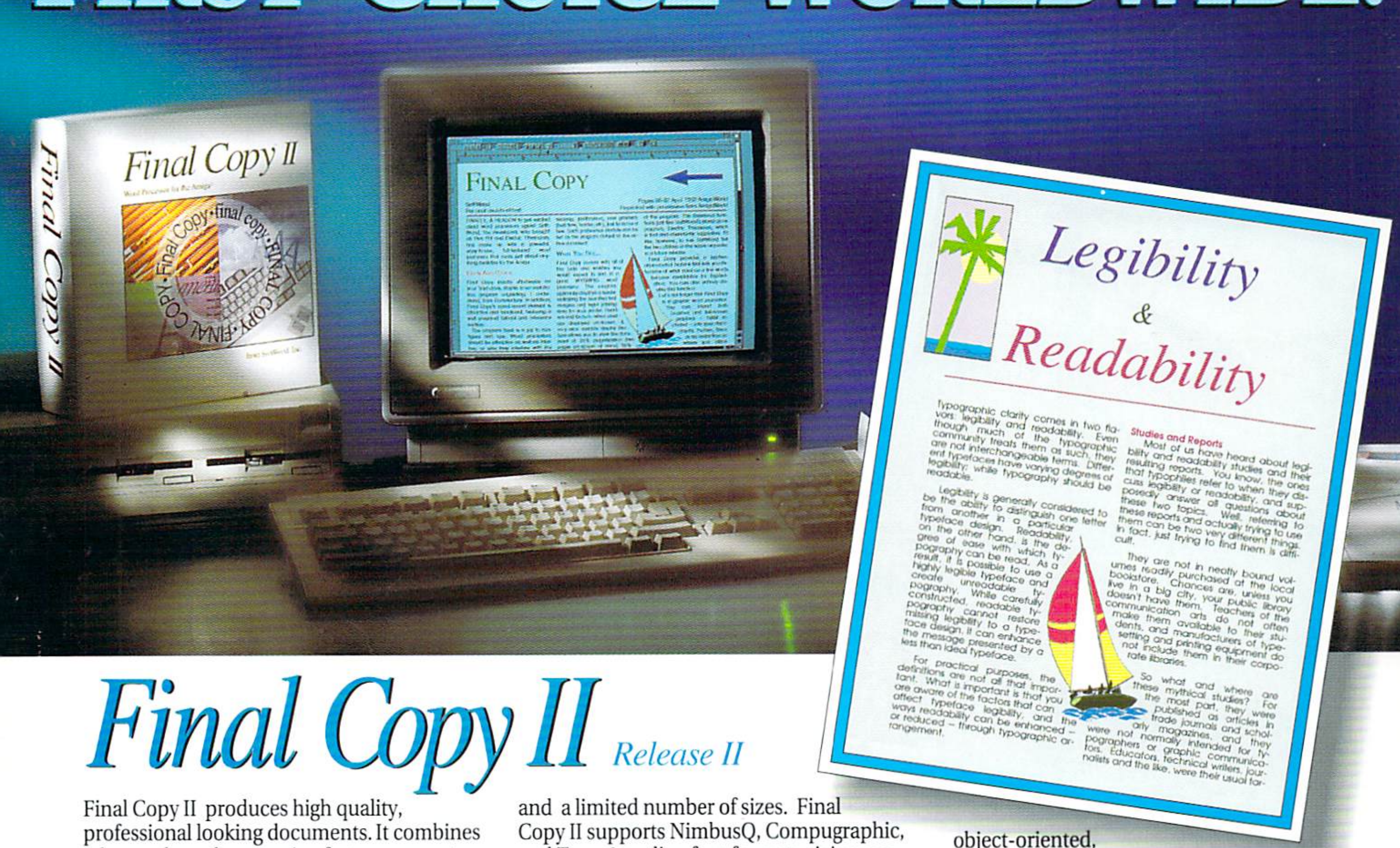
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Amiga-generated animation frame from NBC's new series *SeaQuest.*

FIRST CHOICE WORLDWIDE!



Final Copy II *Release II*

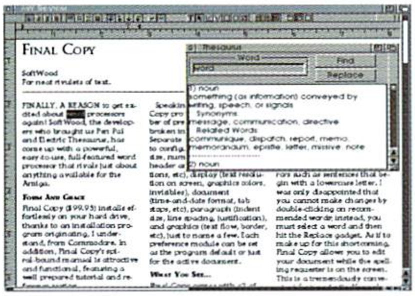
Final Copy II produces high quality, professional looking documents. It combines advanced word processing features, easy-to-use page layout capabilities, and state-of-the-art printing technology into one convenient program.

While other programs claim to have quality printing, Final Copy II is the only word processor on the Amiga that will produce excellent quality printouts on any Workbench (1.3, 2.0 or higher) supported graphic printer. If you have a PostScript printer, Final Copy II is the only word processor on the Amiga that has true WYSIWYG PostScript print capabilities - other programs limit you to a few fonts and a limited number of sizes. Final Copy II supports NimbusQ, Compugraphic, and Type-1 outline font formats giving you access to thousands of commercial and public-domain fonts.

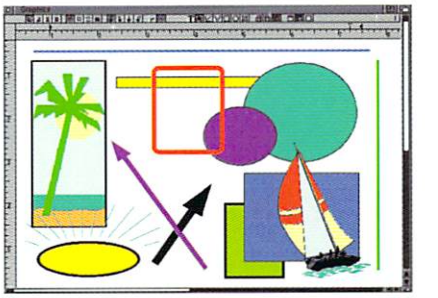
Final Copy II's word processing features include: 144,000 word speller; 1.4 million response thesaurus; automatic hyphenation; named paragraph style sheets; master pages; mail-merge; multiple newspaper style columns; search and replace; header and footer support; left, right, center and decimal tabs; paragraph justification; and automatic date, time, and page number insertion.

Final Copy II's graphic features include: object-oriented, structured tools for drawing boxes, ovals, lines, arrow-tipped lines, and rounded cornered boxes; cropping; graphic sizing; object locking; and graphic depth arranging. Full AGA support lets you work in screens having up to 256 colors.

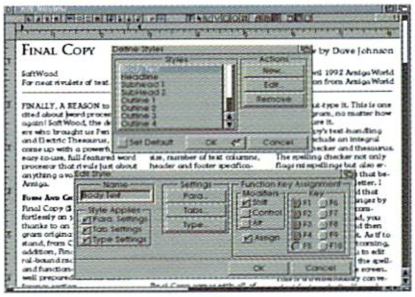
Final Copy II now available in American English, British English, German, French, and French-Canadian versions is the best selling word processor for the Amiga in the world. As stated in a recent AmigaWorld review, "FinalCopy II pulls into the lead of the Amiga word-processing pack."



You want a document that reads well in addition to looking good. Final Copy™ comes with a 144,000 word speller, 1.4 million word thesaurus with definitions, master pages, style sheets, paragraph sorting, math support, mail-merge, automatic hyphenation, and user-defined tab stops to assist you in your writing.



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Style sheets and master pages are features you can really use to ensure your documents are created in a consistent and well-planned manner. Fully editable page views let you work in several levels of reduction and magnification. Multiple snaking columns, left/right pages, and title page options are easy to use.

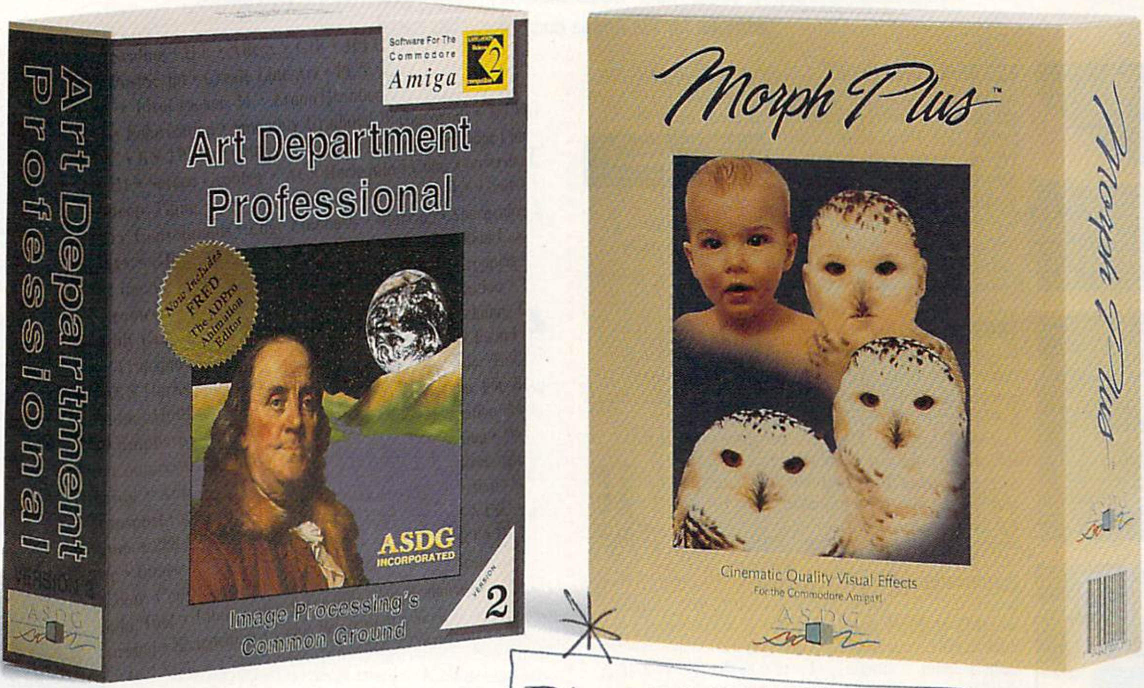
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System Requirements: Amiga® with at least 1 megabyte of RAM and either a hard drive or 2 floppy drives.
To use Compugraphic fonts you must have a hard drive and WB 2.1 or greater.

Imported by: AmigaOberland (Germany), Gordon Harwood Computers (England), TUPsoft (Australia), and Essonne Mailing (France).

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If you're thinking about getting an Amiga® special effects or image processing product, here are some facts to consider:

• ASDG's Art Department Professional was named the "Best Image Processing Program" for 1992 by the readers of Amazing Computing Magazine and "Best Video Software" by Germany's Amiga Plus Magazine.

• American Software And Hardware Distributors and MicroPace Distributors (the two largest Amiga® software distributors in North America) cite ADPro and MorphPlus as the best selling products of their kind.

• ADPro placed third among ALL Amiga® software products on the MicroPace 1992 Top 50 Sellers List.

• The Post Group, one of the largest post production houses in the world, has used ADPro and MorphPlus in the production of special effects for the prime time TV show Quantum Leap and for major motion pictures.

• Mark Swain, an AmigaWorld reviewer (and animator for Foundation Imaging, the creators of the special effects for Babylon 5), said, "MorphPlus produces the most realistic shape shifting special effects I have ever seen on a desktop."

• David Duberman, Executive Editor of Video Toaster User, said in a comparative review of Amiga® morphing products, "MorphPlus is the Rolls Royce of Amiga® morphing software... it will pay for itself with one job."

Consider the facts.
Then bring home the best.

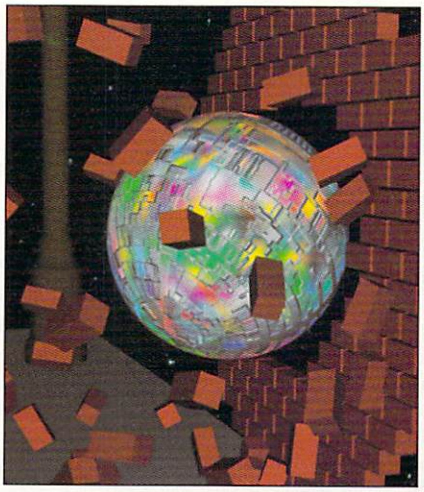
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CONTENTS

VOLUME 9, NUMBER 11, NOVEMBER 1993



*"One, Two, Three . . . More!"—**p. 26.* *Dynamic new features in Amiga 3-D animation programs are responsible for an explosion of new imagery and effects. Check out this 3-D software roundup plus our other animation features and sharpen your creative skills. Who knows, you may join the growing legion of Amiga animators working on Hollywood projects* *(see p. 43).*

COVER PHOTOGRAPH BY EDWARD JUDICE
"SEAQUEST" SCREEN IMAGE COMPLIMENTS OF AMBLIN ENTERTAINMENT

EDITOR'S DRAWER

The Amiga hits the big-time—by breaking new ground in Hollywood.

CHOICE OF THE STARS

We've always proclaimed that the Amiga is a major marquee attraction in the video and animation theater, offering many features and capabilities found in other, highly-touted high-end graphics systems.

But you may be surprised to learn what a leading role the Amiga plays in Hollywood, that Mecca for filmmakers and a hotbed of video- and animation-intensive applications. The Amiga provides major movie and television studios the flexibility to create high-quality images and animation sequences quickly and cheaply.

The Amiga boasts a long—and growing—list of Hollywood credits, including blockbuster films and various exciting new TV shows. Your chest will swell with pride as you learn about the Amiga's accomplishments in the entertainment industry, and read Hollywood's laudatory comments about your favorite computer (story begins on p. 43).

The Amiga's rising-star status is oft-repeated by production people, who claim that the Amiga produces entertainment that is as good or better than other high-end systems costing much more. One Hollywood animator noted, "I don't feel that we would have gotten better results from a high-end machine, like an SGI, but it's a moot point, because the SGI environment here just would not have worked. It would have been prohibitively expensive."

In a land where fantasies can come true, the Amiga has turned the dreams of many professional Hollywood animators, special-effects creators, art directors, and preproduction designers into realities.

The focus of this month's *AmigaWorld* is video and animation applications, so what more appropriate issue to bring you a hands-on look at the new Toaster 4000, the *sine qua non* of Amiga video production? This latest Toaster version offers a number of amazing new features and functions, including improved effects, an easier-to-use CG, and a 3-D program that's the envy of the industry. Current Toaster owners and animators will want to upgrade, and beginners will have even more reason to venture into the world of Toaster video.

The Amiga is the great equalizer. You don't have to be a famous movie maker or talented artist to be able to create some truly amazing video and graphics. In this issue we show you how with a look at the latest in 3-D animation software and techniques. You'll be impressed with the professional features found in this most recent generation of programs.

Next month we look forward to bringing you *AW's* annual games issue, with an update on the latest in AGA and CD32 entertainment software. We'll also post the results of your votes for your favorite Amiga games. In addition, we'll provide a rundown of the new products and happenings at Pasadena's World of Commodore Show.

Dennis Brisson

Dennis Brisson
Editor-in-Chief

AmigaWorld

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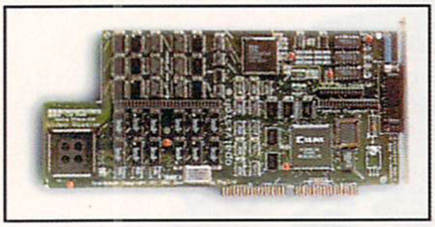
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OpalVision

Seeing is Believing

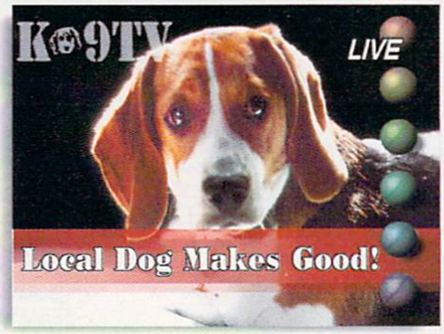
Never before has a system given you all of the necessary tools to create video productions with your own individual style.

Now you can create broadcast quality videos with unmatched ease, power, and versatility: OpalVision gives you lots of inputs in multiple video formats, both PAL and NTSC. Revolutionary DVEs never before available on a personal computer. Chroma and Luma Keying. Real-time framegrabbing. Full Audio Mixing and Equalization. An advanced character generator. Compatibility with all of the important Amiga video, graphics and animation software.



OpalVision Main Board

The core unit of the modular OpalVision system. A true, RGB, 24-Bit frame buffer, it operates in any Amiga computer with a video slot. It allows smooth fading of pictures, color-cycling effects, and smooth, double-buffered 24-Bit animation. Includes connectors for the Video Processor and Scan-Rate Converter/TBC. Includes *OpalPaint*, *Opal Presents* and *OpalAnimMATE* software.



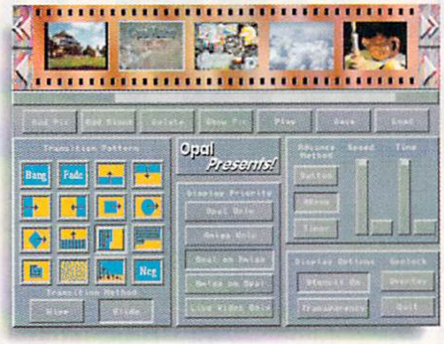
Includes critically-acclaimed *OpalPaint* image processing and painting software. Use the power of OpalPaint to easily create your own images or enhance and modify existing framestores.



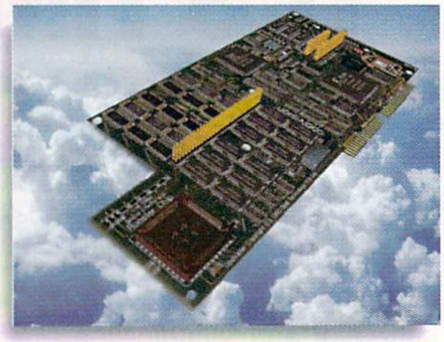
OpalPaint includes an expandable library of image processing modes, texture mapping, color and transparency gradients, multiple work modes, nozzle brushes and many other tools.



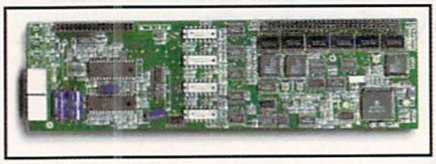
OpalPaint's full range of tools and comprehensive controls provides a level of support for artistic creativity never before available on the Amiga. It's fast. Real-time. Full 24-Bit.



Every Main Board includes *Opal Presents!*, an icon-driven presentation program offering complete display control of OpalVision images, Amiga graphics and live video.



OpalAnimMATE plays animations at rates of up to 60 frames per second. It works in 8, 12, 15, 18 and 24-Bit modes and features selectable screen sizes from 32 x 20 to 768 x 286 pixels.

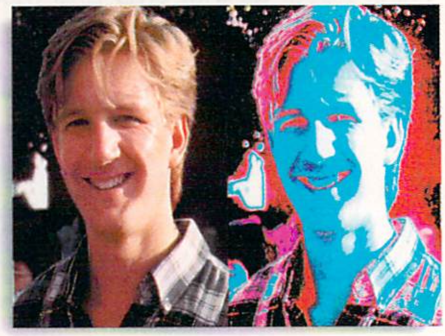


OpalVision Video Processor

Plug this card into the Main Board and add a wealth of additional features: a 24-Bit framegrabber which doesn't require a time base corrector, a professional-quality genlocker with definable chroma and luma keying, a 256-level linear transparency key, a video sandwich key for inserting video into 3D screens, real-time color processing of live video and an unlimited number of transitions and customizable Digital Video Effects using the included OpalVision Roaster Chip and software.



The OpalVision switcher allows easy "drag-and-drop" groupings of icon-based DVE's including ANIM based effects, chroma and luma effects and exclusive OpalVision "Roaster Chip" effects.

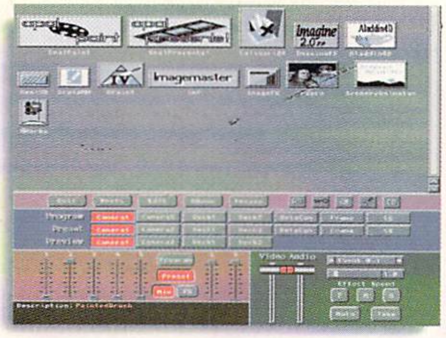


The Video Processor offers real-time color processing of both live video and framestores. Create glows, shines, luminance effects, posterizations, nuclear effects and more.

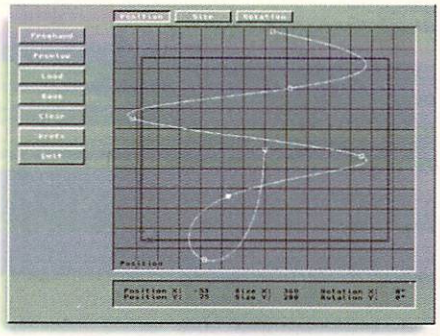


The 256-level linear keyer (Alpha channel and transparency effects) allows the definition of transparency between two video sources on a pixel-by-pixel basis for excellent vignetting and super-smooth shadow effects. The keyer can be taken from the Video Processor or an external video source, and/or output to another production switcher. The Alpha channel also gives you the ability to create highly realistic soft-edged transitions and organic effects. Superb 32-bit graphics with precise and detailed Alpha channel definitions can be created in *OpalPaint*.

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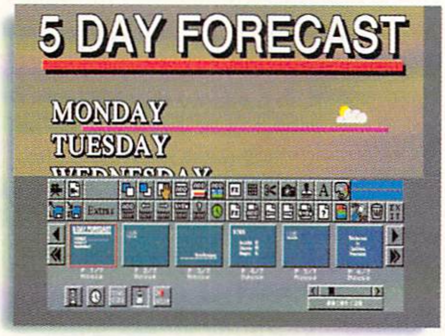
In addition to the wealth of software included with the OpalVision system, you can access a wide array of OpalVision-compatible Amiga software directly from the switcher screen!



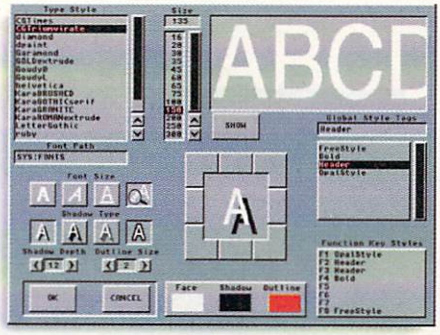
The on-screen editor makes creating your own DVE's fast and easy. Define the position, size and X or Y rotation and the Roaster Chip will transform any video signal at your command.



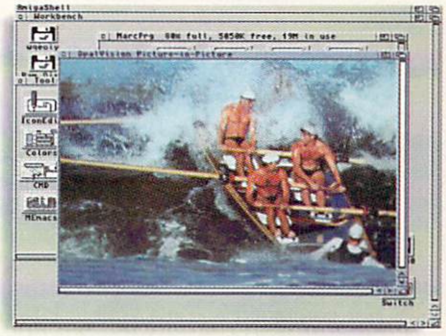
The Video Processor's broadcast-quality genlocker allows both Amiga and OpalVision-generated graphics and animations to be combined with any video source.



The Opal Character Generator offers full 35ns text capability on the A3000 or 4000. Supports Amiga, Compugraphic and Color fonts. CG pages may be incorporated directly into the switcher.



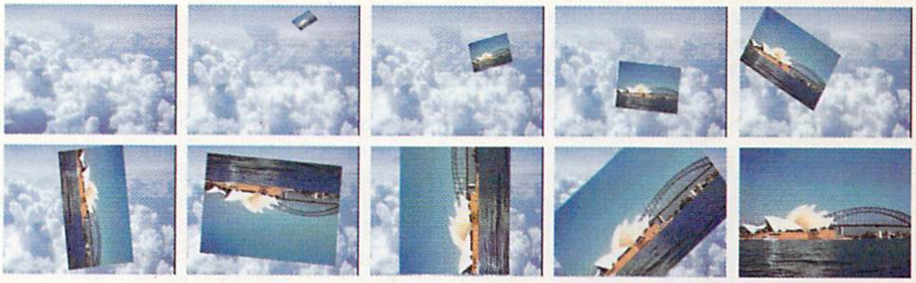
Opal Character Generator features selectable font size, color, outline, drop shadow and anti-aliasing. The CG also creates draggable boxes of text, graphic separators, or IFF brushes and pictures.

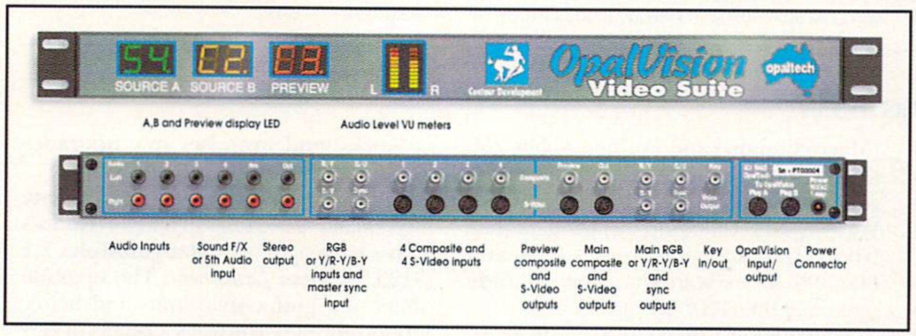


Any video input can be displayed in a draggable, scrollable and resizable window on the Amiga Workbench. Also allows zooming in and out and has AREXX for remote control from other software.

OpalVision Roaster Chip

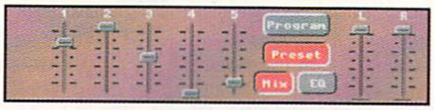
The exclusive technology of the OpalVision Roaster Chip provides an endless number of user-definable Digital Video Effects. Take any two video sources (or an Amiga or OpalVision generated graphic). Flip it . Scale it. Rotate it on the X, Y or Z axis. Move it along a path. Zoom in. Move out. You have complete control. Build your own custom library of useful wipes and effects and give your videos a unique style. OpalVision is the only video system in its price class which gives you this kind of power. You've got to see it to believe it!





OpalVision Video Suite

A 19-inch, rack-mountable, video/audio mixing, switching and transcoding device which connects directly to the Video Processor. Nine video and ten audio inputs are available simultaneously in RGB, Y/R-Y/B-Y, Composite and S-Video. Choose two sources from these inputs, assign a transition or special effect provided by the Video Processor, and trigger it manually or automatically. The linear transparency key provides transparency control between video sources on a pixel-by-pixel basis. The ten audio inputs (five stereo pairs) are fully software-sequenced with smooth fades and full, 5-band frequency equalization.



The automated audio mixer (shown here in a detail from the switcher control panel) features full audio-follows-video capability, plus an on-screen panel with sliders for each of the five stereo audio inputs available on the Video Suite. Sliders control volume and/or 5-band EQ.

OpalVision Scan-Rate Converter/TBC

Add this card and achieve 31Khz, non-interlaced output of Amiga and OpalVision graphics and any incoming video source in either PAL or NTSC. Includes full time-base correction of incoming video. The on-board memory also serves as an additional frame-store.

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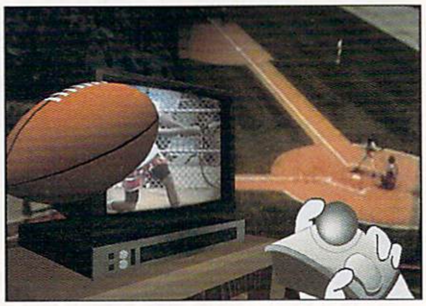
News, New Products and Networks

Amigas Depict Future

Time Warner's Full Service Network, an interactive digital cable-TV system, isn't available yet. In fact, it was a vision that existed only on paper and in press reports—until it met the Amiga by way of Co-directions, a New York City-based video-production house.

Wanting a working simulation to help drum up support from ad agencies and major corporations, Time Warner Interactive Group turned to Co-directions, which chose the Amiga as its main workstation "because of the short deadline and large and complex amount of graphic and animation material needed," according to Co-directions' president Joe Tripician. Having recently won an Emmy for the PBS documentary *Metaphoria* (which also used Amigas), Co-directions felt confident of the machine.

Tripician, Animation Director Merrill Aldigheri, and five animators worked with Time's TV Development Division and Producer Ken Witty. Their task was to design not only fun and logical on-screen graphics for consumers to navigate through myriad options, but also the hardware. "Using real TVs and existing remote devices would [have been] too limiting and misleading," explained Aldigheri. So Jacques Tege and Paul Garrin modeled the new components using NewTek's LightWave 3D, while Al Arthur created the 3-D environments. GVP's Cinemorph helped create transitions between 3-D settings; DeluxePaint and Scala MM200 also came in handy. In less than one month the group produced over nine minutes of animation.



In the opening sequence of the Full Service Network video, a room morphs between various environments while video clips and on-screen menus change on the television.

The production features whimsical, animated characters that help lighten the techno-talk by interacting with the system. Aldigheri designed these characters to layer onto the rest of the program in the on-line edit suite. This way the team could alter the constantly evolving screen images and equipment up to the last minute without losing ground. Co-directions dumped all the animations and graphics from the Video Toaster to Beta SP videotape using Nucleus' Personal Single Frame Controller. The group then edited the production to D2 tape for a crisp look.

According to Tripician, Time Warner is extremely pleased with the results. While there are no plans to make the tape public, Co-directions has just finished a ten-minute film trailer it will present in the US and Europe to promote production of a psychological horror feature called *Motel Blue 19*. "We used the Amiga for the animated opening and closing titles, and plan to incorporate morphing into the feature," says Aldigheri. *—BG*

Something Old, Something New

Who says you can't teach an old dog new tricks? This month's rundown of upgrades should put that theory to rest with several familiar packages offering new features and improvements.

Want to teach your Amiga some MAGIC tricks? With the new **ImageFX 1.5** ($429, ***Great Valley Products***) you can share images, in memory, between several graphics programs via the program's MAGIC (Multi-Application Graphic Image Communications) protocol. Other new additions to the image-processing program include, ViewTek (an image and animation viewing program), new loaders and savers, preview modes for DCTV, OpalVision, and Super Amiga, and modules for VLab (MacroSystems) and Framegrabber 256 (Progressive Peripherals & Software). It supports GigaMem (Pre'spect Technics), Wacom and Calcomp drawing tablets from TriMedia, and Epson's 300c and 600/800 series scanners. The upgrade costs $29.95. (RS# 135.)

MathVision Video Gold ($749, ***Seven Seas Software***), a video special-effects package, supports AGA and 24-bit graphic displays. It includes video-production scripts and techniques to create custom wipes, warps, and distortions via a capability called Custom Effect Design. The software works with OpalVision and DCTV directly, and with the Toaster and IV24 indirectly. Seven Seas offers ongoing E-mail via CompuServe and other networks, and promises free upgrades for a year after purchase. (RS# 136.)

Here's a neat trick—you can create high-quality video titles in hangul (Korea's native language) with **Hangul-Alpha 2.1** ($129.95, ***Mesa Graphics***). The upgrade offers new gothic-style fonts and better support for hi-res displays. Owners of version 2.0 can upgrade for $15; owners of previous versions for $50. (RS# 137.)

You can make your Amiga sit up and sing with **OctaMED Professional version 5** ($69.95, ***DevWare***). The music and sound sequencer supports 64 MIDI tracks and features improved editing effects. OctaMED Professional is compatible with AmigaDOS 2.0 and later. (RS# 130.)

To locate the vendors of products mentioned, see the "Manufacturers'/Distributors' Addresses" list on p. 90.

You love videography. It's your life. So why get involved with a video editing system that seems attractive now, but can't accommodate your needs in the future; an editing system that shows signs of age as soon as your entry-level video devices have to be upgraded?

The beauty of AmiLink CIP editing system is that it's totally devoted to your career. AmiLink CIP has been specifically designed to stay with you all the way no matter where it all leads.

The day you're ready to improve your abilities in character generation, animation techniques or special effects, AmiLink CIP will be at your side. When you make the crucial decision to build your business on larger, more sophisticated projects and build a reputation of quality at the same time,



Are you about to marry an editing system that can't keep up with your career?

AmiLink CIP will support each and every one of your efforts.

Not too surprising when you consider that AmiLink CIP's parents are video people not computer people. AmiLink CIP is from RGB, the same company delivering pro-quality editing to pro-editors and Video Toaster™ users all across the country.

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RGB Computer & Video, Inc.
Picture Perfect

AmiLink uses the industry standard V-LAN universal control network

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Help Yourself

Need some advice about your Amiga? Check out the latest "self-help" guides.

The **Guide for Art Department Professional, Volume 2.3** ($39.95, ***Dreamworks Video Productions***) is a video tutorial that features explanations and how-to guidance on the program's ARexx scripts, Toaster Framestore support, and such special effects as Collapse and Polar Mosaic. (RS# 122.)

A general reference guide on disk, the **Amiga Online Reference Manual 2** ($49.95, ***Area52***) is geared to both the novice and experienced user. It's got a hypertext-style point-and-click interface, and offers definitions, descriptions, and Q&A. Other features include indexes of Guru errors and documented AmigaDOS commands, and comparisons of various products and systems. (RS# 123.)

Want to learn how to create 3-D animations with a fractal-landscape generator? You can enroll in **Animation 202: Fractal Freedom** ($35, ***Myriad Visual Adventures***), a one-hour instructional videotape. The award-winning production by D.L. Richardson features a short action/adventure movie called *Oklahoma Ken* and a lesson on work behind the scenes of the film. (RS# 124.)

Making the Switch

So, Bridgeboard users, you have two video displays but only one monitor? You could keep plugging and unplugging your monitor between the two...but ***MachTen Computer Products*** has a more convenient solution. With **The Switch Man** ($46.95) you can connect two VGA outputs to one VGA monitor. You can choose to view either Amiga graphics or PC graphics with the flick of a switch. Likewise, you can hook up two monitors to one video display. The necessary cables are included. (RS# 121.)

More For Multimedia

The **3.0SP Multimedia Controller** ($995, ***Interactive MicroSystems***) offers four serial ports and six GPI outputs to control up to six VTRs. It can be adapted to control infrared devices such as compact-disc, laser-disc, and photo-disc players. The optional **MediaEditor** ($450) software controls Panasonic WJMX series switchers, NewTek's Toaster, and genlocks for A/B rolls, special effects, and title overlays. (RS# 133.)

You can steer your way through your video productions with the **VideoPilot V330** (£1299, ***Apollo Mercury***), a video-editing unit. The VideoPilot supports VHS, SVHS, 8mm, and Hi8 formats and all international time codes (LTC, VITC, and RCTC). It features a built-in linear time-code generator so that master tapes can be the edit source. The VideoPilot offers a full range of editing capabilities such as A/B roll editing, a DPaint-compatible titler, and special effects. (RS# 134.)



ON-LINE SCAN

By Tim Walsh

If Shakespeare were available for comment today, he'd probably read *AmigaWorld* and drop e-mail on the nets to us, posing such deep questions as, "Pray, what maketh a utility?" My 11-word definition, while hardly worthy of literary praise, sums it up nicely: Any program that makes using your Amiga easier or more productive.

Research for this month's column didn't even require looking beyond my own computer. It house all of the best Amiga utilities from the last 12 months or so under its beige hood. Available on virtually all the major nets, you may recall seeing some discussed in previous columns (those are the ones worth more than one mention). In alphabetical order, here are some of my favorites:

AIBB (Amiga Intuition Based Benchmark)

No other program anywhere (with the exception of SysInfo, below) can tell you as much about your Amiga. Reviewers and hardware developers rely heavily on AIBB by LaMonte Koop to tell them how well their Amiga is working and how its performance compares to other models.

AIBB's ability to test your computer's strengths in more than one area is its forte. For example, an old accelerator-equipped A2000 might conduct math operations just as quickly as an A4000/030, but the newer machine can perform graph operations several times quicker. AIBB reveals just such information.

DiskSalv 2

Amiga users seeking a peaceful coexistence with their computers need Dave Haynie's Disk Salv 2. This shareware ($10) program is the most user-friendly, powerful, and versatile freely-distributable Amiga disk-recovery utility on the planet.

Do you need to retrieve inadvertently erased files? No problem—just select the Undelete option from DiskSalv. Want to repair, validate, or unformat a troublesome Amiga device? DiskSalv 2 can do those with relative aplomb, and keep you appraised of its progress.

DiskSpeed 4.2

Michael Sinz, one of the most prolific Amiga programmers of all time, wrote DiskSpeed 4.2 to let Amiga users find out just how well their disk drives work. There's not much involved in using the program—just enter the name of the device to test and DiskSpeed goes about its business.

You'll see just how quickly a particular device can open, create, and delete files, and how the CPU can affect performance. Those with SCSI device-equipped Amigas will find a version designed expressly for their systems, too.

Noisome

No, I don't like the name, either. But Noisome gives my A4000 the ability to generate all manner of sounds, and for that reason it's one of my favorites. Overlooked on most nets due to a minimalist description, this little utility from David Larsson adds sounds to just about every function that requires user input.

This commodity sits unobtrusively in the background, ready to call up any user-specified IFF-sound file from any device. You can choose between two mono or two stereo methods of output and filter settings. Screen flashes can be replaced with a sound, which is nothing new, but sounds for left and right mouse buttons, the spacebar, keyboard keys, and a veritable grocery list of packaged sounds make for a...ahem...sound package.

Silicon Menus

One of my favorite utilities of all time, Silicon Menus (SM for short) has a dull name, but its effects on the operating system are anything but dull. Written by Greg Cunningham, a name familiar to many Amiga users, the file can be a little difficult to find on the nets. Just search on SM or SILICON. Once you download it, drop the program's icon in your WBStartup drawer and it'll activate automatically.

With the program running, a variety of options allow Work-

Melody Makers

If there's a song in your heart, the **Song Creator** ($59.95, ***New Sound Music***) can get you composing and jamming. The music composition program offers a collection of more than 120 sequences for background music and soundtracks. You select the musical style (including jazz, folk, country, and blues) and the software provides a complete arrangement of up to five musical parts. The Song Creator requires a MIDI interface and a compatible sequencer. (RS# 129.)

If you're a little leary of your musical ability, you can brush up on the basics with one of the instructional programs from ***DevWare*: Mozart's Music Master** or **Blues Tutor** (each $29.95).

Mozart's Music Master offers test-like activities that can teach you the basics of note reading and music theory, the four scales, interval ear training, and more. The included database defines musical terms and symbols for you.

Blues Tutor is a MIDI-based program that teaches the true blues keyboard. After each session, you will be rewarded with the fruits of your labor—an actual musical piece. Blues Tutor works on any Amiga and with any version of AmigaDOS. It requires a MIDI-compatible sequencer. (RS# 130.)



OVERHEARD

If you have a modem, you can learn about the latest research underway at the nine campuses of the University of California. **The UC NewsWire** is free and available 24 hours a day; call 800/395-5266 on your communications software to access the latest advancements in more than 30 fields including astronomy, education, and medicine.

Warped Reality

Warp 10 ($795, ***RSC Management***) does allow you to warp (and morph) images, but that's not the only reason for its name. This program promises to be the fastest morphing and warping software for the Amiga. It's speed is fueled by Digital Micronics' Vivid 24 graphics card, installed with at least one TMS34082 coprocessor with SRAM. You can create animated 24-bit warps (image distortions) and morphs (transformations of one image to another) and play them back in real time. Although Warp 10 works in 24-bit mode, it can load normal IFF images, too. Warp 10 is available as either a standalone package to use with Vivid 24 or as an add-on module to the card's Animator Broadcast software. (RS# 132.)

bench menus to appear wherever the pointer happens to be when the right mouse button is pressed. Okay, you say, but what happens if the pointer is in the lower-right corner of the screen? Easy—SM instantly readjusts the menu's positions so that they appear to the left. Under 3.0, the program is font-sensitive, which greatly enhances its visual impact.

SuperDark

A take off on the popular After Dark-type screen-saver programs found on the PC and Macintosh platforms, Thomas Landspurg's Superdark is the most versatile, option-laden screen-blanking utility yet for the Amiga. It's fully 2.0- and 3.0-compatible, and it offers some fascinating AGA-specific graphics that rival the new school of blankers found on the top-drawer Macs. Superdark also provides the usual blankers—fireworks, swarms of bees, and a sliding screen, to name a few.

Best of all, there's no need to worry which of the blankers will work on your pre-3.0 machine—the program lets you know when you try to activate the program. Error checking in the program detects whether you have the chip set or chip RAM to operate a particular blanker.

SuperDuper 3.0

You may wonder what all the fuss is about over a disk copier. You'll stop wondering once you've witnessed the speed of SuperDuper by Sebastiano Vigna. It copies any disks you throw at it in record time on your Amiga model of choice, including those finicky NDOS Kickstart and third-party Kickwork disks for your old A1000. Completely button-driven (no menus), SD 3.0 offers an extensive list of copy options that could fill this page. Switch options include Verify, Date, Fast File System, Directory Cache, and Talk mode. Specifying starting and ending cylinders is also a snap with SD.

SysInfo

If you need to know how well your Amiga compares to others, or how well the drives, RAM, and other systems are functioning, or just need a really nifty system-performance utility, Nic Wilson's SysInfo is just the ticket. Currently at version 3.22, this $20 shareware program complements AIBB nicely and tests more than just system performance.

There are options for monitoring everything you'd care to check—memory, system speed, drive performance, comparisons to other systems, and a host of other factors. While similar to AIBB, SysInfo takes a different approach to the testing and seems to operate faster.

Tool Manager V2.1

When Amiga users ask me which large-scale (over 500K) utility to spend their hard-earned money downloading, I recommend Stefan Becker's Tool Manager. Updated last May to version 2.1, this wonderful utility adds items to the Tools menu on your Workbench in a much better manner than Commodore's own 2.0/3.0 bundled tool. There's no comparison between the two.

Designed with function to follow form, there's a lot to like: Full ARexx support, samples to show how to put it to use, and docs in several languages make this a truly international, user-friendly program. Highly recommended for users of all experience levels.

ViewTek

Probably no other utility on my hard disk gets a more strenuous workout than Thomas Krehbiel's ViewTek. A late-August update (v1.5) is the consummate image-viewing program, ready at a moment's notice. You can call up and display any IFF, GIF, JPEG, and other tough-to-view graphics files, animations, and seemingly anything else graphics-wise you throw its way. Best of all, it takes full advantage of the AGA chip set.

Virus Checker

Another late-August update (V6.30), John Veldthuis' acclaimed anti-virus program appeared on nets and BBSs to serve as a reminder of this program's significance. The program has undergone minor improvements, including the ability to detect and remove a new and particularly malicious virus that writes to your hard disk. A must-have.

BIX
800/695-4882
617/354-4137

CompuServe
614/457-0802
800/848-8199

Delphi
800/695-4005

GEnie
800/638-9636

Portal
408/973-9111

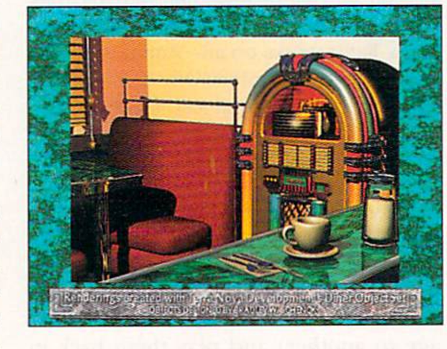
Next month: The best of '93 games. □

Get It Pegged

Before you buy that costly large-capacity hard drive for your 3-D animations, you might consider **Pegger** ($95, ***Heifner Communications/Express-Way Software***), a multitasking utility that can automatically compress the output of your 3-D rendering or graphics program into a JPEG file. What's more, it provides a link for products such as the Video Toaster or DeluxePaint that do not support the JPEG format. With it, you can process images up to 32,000 pixels wide using less than 4MB of RAM. And with optimized code, Pegger promises fast processing and batch processing. Pegger supports ARexx and AmigaDOS 2.0 and later. (RS# 139.)

Retro Renderings

You can recreate the charm of the '50s with **Diner** ($47.50, ***Terra Nova Development***), a three-disk set of 3-D objects for Impulse's Imagine. The collection features both hi- and lo-res objects with a '50s diner theme (including a jukebox, counters, and booths) and two scenes: one that can be rendered with a 5MB system and one that requires 14MB to render. The object set is the first in Terra Nova Development's Designer Object series and showcases the talent of computer artist Bradley W. Schenck, whose work appears in the new CD-ROM game, Labyrinth (Electronic Arts). (RS# 131.)



Take a trip down memory lane with the Diner object set.

Personal Productivity

School's in session and two new software packages can help you catch up on your "homework."

You can give your kids a head start in learning math basics with **Dinomath** ($39.95, ***Achieve***), an interactive learning game for children ages five to ten. Dinomath features a drill-and-practice format with a colorful dinosaur theme. It covers addition, subtraction, multiplication, and division. With each correct response, a piece of a dinosaur fossil is unearthed, which eventually transforms into a "live" being. (RS# 138.)

Is your desk cluttered with paperwork? You can organize all of your personal and home records on your Amiga with **Home Manager Professional** ($29.95, ***DevWare***). The software features databases for organizing addresses, business and personal contacts, and home inventories. Also included are an appointment calendar, an area-code directory, a notepad, and a "to do" list. (RS# 130.)

Picture This

If you're drawing program-design flowcharts manually before you begin typing code, you may be wasting time. **FedCase**, from the Dutch developer ***Joosen Software***, uses logical symbols to define your design. It gives you an overview of the function you are programming, and generates C code (and commenting) that you can compile using any Amiga C compiler, or a C compiler on another computer platform. FedCase provides an ARexx interface, and has a hypertext function to guide you through the jungle of system functions, structures, and so on. It lets you split projects among multiple flowcharts and programmers, and can use existing code or libraries. (RS# 140.)

Command Performance

With **RPaint** ($79.95, ***MegageM***), a full-featured paint program with ARexx capabilities, you can create animated presentations on the fly! RPaint can generate animated or slideshow-type chart and graph presentations in real time via ARexx- or DOS-script commands, and integrates seamlessly with other ARexx-compatible packages so you won't need to store the images on your hard disk first. The program's script commands are documented and easy to learn. Several self-running demo scipts are included. RPaint supports all Amiga ECS (Enhanced Chip Set) graphics modes except HAM, and requires DOS 2.04 and later. (RS# 120.)



OVERHEARD

The Service Management Group (SMG) is the new administrator for Commodore's the US warranty program. SMG now handles all warranty-related activities with CBM resellers and service centers and distributes CBM parts in the US.

Commodore has restructured its support programs, which are no longer bundled; instead, buyers can purchase separately the service program that best meets their needs. The Gold Service program for instance, is now available through SMG under a variety of options. For more information contact SMG at 410/992-9975.

CD Collection

This month's countdown finds several new CDs on the Amiga software charts.

From the ***Syndesis*** label comes **Syndesis 3D-ROM** ($199.95), an anthology of more than 500 freely distributable 3-D models in formats compatible with NewTek's LightWave and Impulse's Imagine. Because the disc is ISO-9660 standard and works on any computer platform, it also supports Autodesk's AutoCAD DXF, 3D Studio, and Wavefront.obj formats. The collection includes numerous automobiles, spaceships, humanoids, buildings, and more than 400 texture maps, along with various demo objects from 3-D model developers. The disc contains a catalog with information on using them. (RS# 125.)

Texture Heaven ($89) and **Asim CDFS 2.0** ($79) debut on the charts from ***Asimware Innovations*** (RS# 126).

Texture Heaven contains 18 wilderness scenery images as well as various traditional 24-bit IFF textures such as wood, tile, and marble.

With the Asim CDFS 2.0 file system you can access most CD-ROM formats, including ISO-9660, High Sierra, and Macintosh HFS. Included on the disc is AsimTunes 2.0, an audio CD controller; AsimPhoto lets you convert Kodak PhotoCD images to 24-bit IFF format; FishMarket 2.0 comprises Fred Fish disks 100–880. Asim CDFS 2.0 is compatible with most SCSI controllers.

If you have Sign Engine Pro, ***Parallel Motion Graphics'*** sign-making and engraving program, you may want to check out the company's latest release: **The Serial III Typecollection** ($499.95) on CD-ROM, which offers 4000 PostScript Type 1 sign fonts. (RS# 127.)



For cutting edge audio editing, make tracks for Studio 16™ 3.0

Studio 16 is the state-of-the-art in audio for video editing. So simple to use, you'll find yourself listening to your new music tracks, foley effects, and voice-overs in no time. In fact, with Studio 16 3.0's highly intuitive time-line based cue list, audio production is as easy as point and click.

With automatic fades and cross fades, you can try as many different combinations as you'd like, without worrying about altering original audio files. Frame by frame accuracy gives you precise control over the placement of every audio edit.

The power of digital, non-linear audio editing and hard disk recording adds all of these incredible capabilities to your Amiga and Video Toaster. Just imagine the power of eight tracks of CD quality, sixteen-bit stereo playing off your computer's hard drive in real time. All for just $1495.

Better yet, Studio 16 3.0's multiple card support can give you up to twelve tracks of simultaneous audio playback† with assignable channel inputs and outputs.

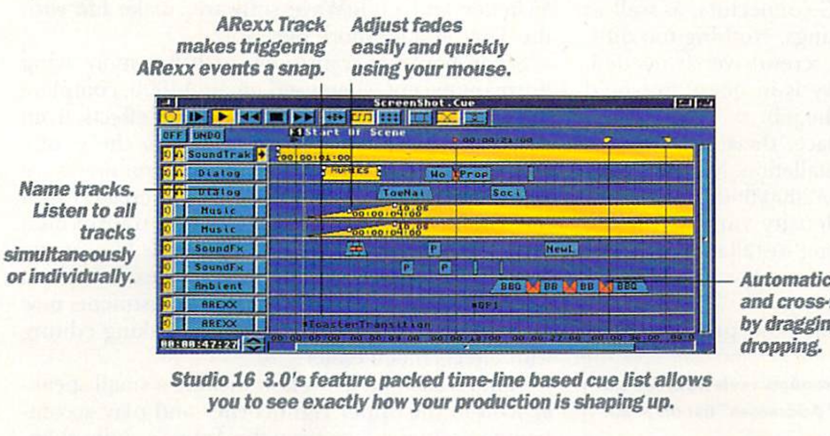
Want more? The ARexx Track gives you complete control over all your ARexx compatible devices, locked to SMPTE time code, from within Studio 16 3.0's time-line cue list. Automated mixing allows you to pre-program the volume and pan levels. Plus, Studio 16 3.0 has third party integration with AmiLink, Bars & Pipes Professional, the Digital Animation Recorder, SCALA, and T-Rexx Professional.

Before you edit your next video, find out how Studio 16 3.0 will bring you to the cutting edge of the digital audio revolution.

Call today for a free information packet, **(408) 374-4962**, or fax us at (408) 374-4963. Get the complete digital audio solution – Studio 16 3.0.

Studio 16 2.0 users – call about our special prices on software upgrades.

SunRize INDUSTRIES



Studio 16 3.0's feature packed time-line based cue list allows you to see exactly how your production is shaping up.

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Circle 57 on Reader Service card.

REVIE

The newest hardware and software versions of the popular video production tool.

Video Toaster 4000
Toaster 3.0 Software

NewTek, $2395.
Amiga 2000/3000/4000.
Video slot connection.
Hard-disk installable.
Not copy protected.
2.0/3.0 compatible.
Accelerator compatible.

Minimum system: Amiga 2000, 80MB of storage space, 9MB of RAM, two video monitors; Amiga 4000 required to access AGA modes.
Recommended system: Amiga 4000, 68030 or 68040 accelerator, 120MB+ storage space, 13MB+ RAM.
Installation: Involved (see review).

If awards were given in the desktop-video industry for the most innovative and just plain overachieving video product available for the Amiga in 1993, NewTek's Toaster 4000 video board would win hands-down. It's really, however, the accompanying Toaster 3.0 software, more than the redesigned board itself, that adds a myriad of features and functions previously unavailable in the Toaster environment. Rest assured that the software functions the same way on all machines, except for a smattering of new AGA-related features that spring to life only when used on the Amiga 4000.

Installation

The Toaster 4000, unlike earlier Toasters, now installs in any Amiga with a video slot, including, of course, the A4000. The card comes already configured for installation in either an A3000 or A4000. To install it in an A2000, you must remove and rotate the rear-mounted BNC connectors, as well as alter a series of jumper settings. Nothing too difficult, mind you, and only a screwdriver is needed, but if your mechanical savvy is in question, you'd best get your dealer to do the job.

With the hardware in place, there remains the daunting task of software installation. No fewer than 30 disks are needed on the A2000/3000 and 45 (including ten of the high-density variety) on the A4000. During this hour-long installation process, a dialog box thoughtfully reminds you to fill out your warranty card.

Once installed, the Toaster 3.0 programs and files occupy about 85MB of hard-disk space. While the installation procedure is simple enough, a little more flexibility would be welcome. Currently, all of the software and files must be installed to share a common device. A better procedure would be to allow specific file selection and specification of destination devices and directories.

Slicker, Swifter Switcher

As expected, the main control screen of the Toaster is the Switcher. As with earlier models, you'll find four inputs and two digital video channels. Instead of a Background button, there's a DV3 button that controls the background color shown during different transitions and during animation playback from LightWave.

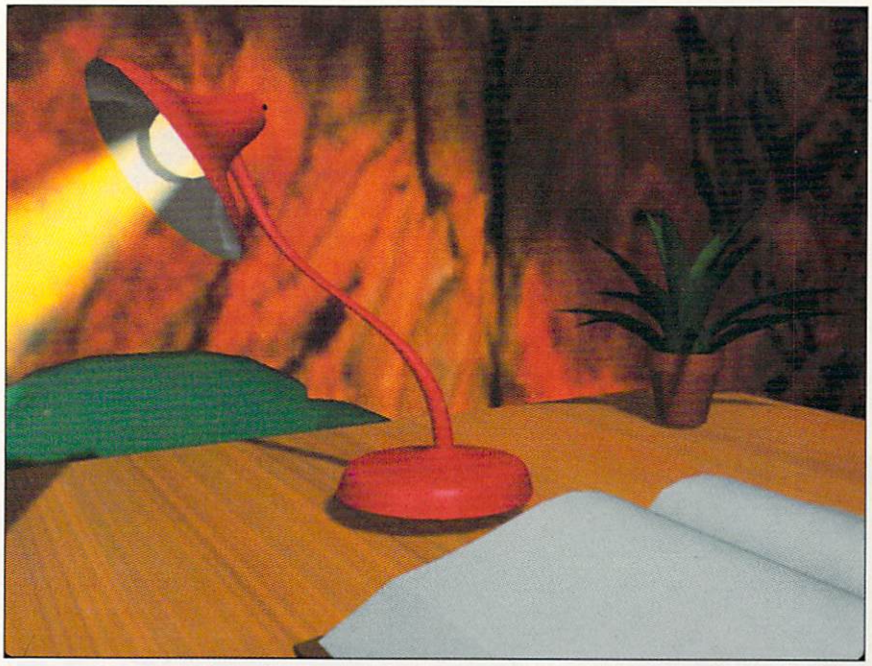
Of particular interest is a new pop-up menu that displays a list of choices so you no longer have to scroll through lists of framestore names with the arrow keys. These menus, used throughout the Switcher and LightWave software, make life with the Toaster a lot more pleasant.

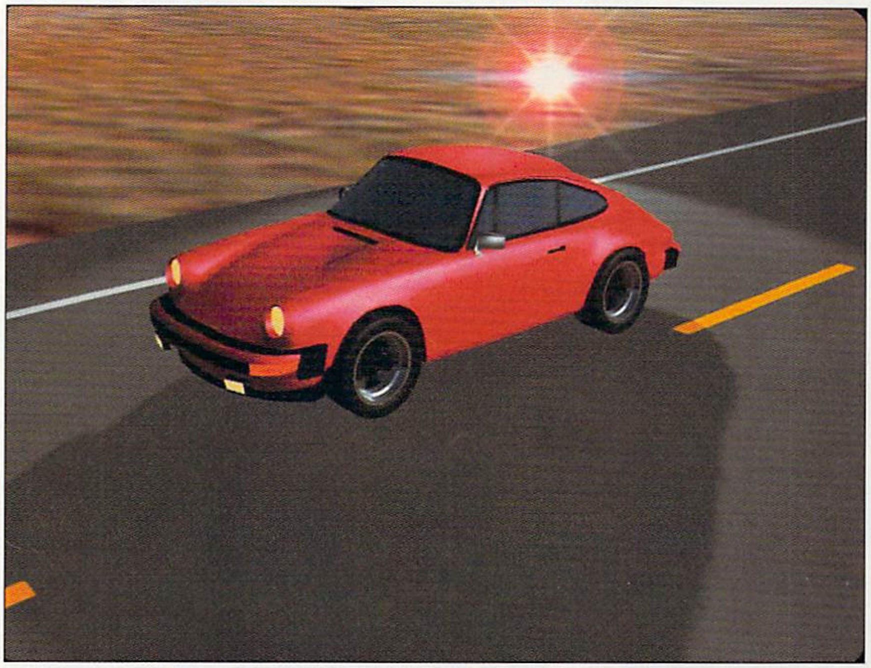
Seven banks of transitions, with two more lying dormant except when used on an A4000, complete the scene. These cover a wide variety of effects, from the common (pushes, flips, spins) to the exotic (smoke, liquid, and snow). Some of them now have transparent drop shadows, which are created with the Toaster's Alpha Channel and give transitions a look that's best described as high-end. Also, many now possess user-definable speed for exact control of their duration. Effects that lack adjustments now show their length in video frames, making editing with effects much easier.

Some transition icons now include a small speaker icon in the upper right corner and play accompanying sound effects from the Amiga's audio chan-

To locate the vendors of the products reviewed, see the "Manufacturers'/Distributors' Addresses" list on p. 90.

W S





Toaster-generated 3-D images never looked better than with LightWave 3.0.

nels. The sounds of sheep (that familiar "baa-baa") and breaking glass can now be added to your videos. While clever, these sound effects are probably not in high demand in production environments. The lack of an easy way for users to add their own sounds to transition effects is disappointing.

Using the Toaster 4000 on an A4000 allows access to the previously-mentioned additional two banks of effects. Not surprisingly, many of these feature AGA-animated transitions, ranging from moving bars and patterns to complete animations. Examples include a full-color Kiki effect and the screen flying into space at warp speed. Other effects include stylistic touches—such as applying glints to the video signal—that give otherwise mundane transitions an almost magical look. The AGA-related effects are improvements over previously-animated transitions and are sure to become standard fare on television.

Choice CG

The major new feature for Toaster Character Generation (CG) is mouse control, a clear improvement over previous versions of the CG, which relied solely on keyboard input. Positioning and editing text is now as simple as selecting the item you want to edit and moving it to a new position. You can now edit individual characters, words, or entire lines for size, color, outlines, drop shadows, and more. The Toaster's Alpha Channel support allows for adjustable transparency of both fonts and shadows.

Postscript Type One font support in the CG is also welcome news, since it allows for a greater selection of third-party fonts and improved control over the sizes and styles available on the CG pages. As well as a selection of regular Toaster fonts, the new software comes complete with over 250 Postscript fonts, which can range from 10 to 400 lines tall on a CG page. A useful addition to the Toaster documentation is a Font Guide that displays all the Postscript fonts.

You can also now load brushes from ToasterPaint for use as elements in CG pages. As expected, these brushes can be placed anywhere on the page and can also contain controllable transparency and drop shadows. The ability to add 24-bit brushes to CG pages not only increases creative options, but also allows for clean, professional-looking pages.

The only drawback is that brushes are represented by boxes on the CG interface and appear in color only after they've been rendered. This makes it somewhat difficult to differentiate between various brushes, especially when you're working with more than a few of them on a particular page. The ability to see the brushes, even in low resolution, would be welcome.

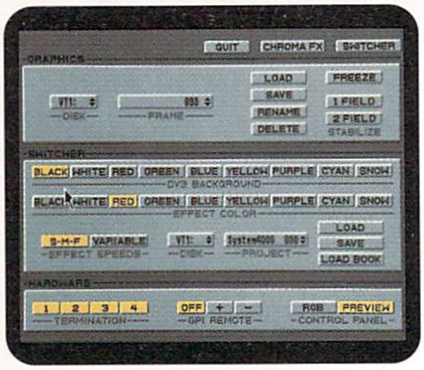
Overall, though, the improved CG is a big step ►

forward. It will probably become the CG of choice in many Toaster-equipped video suites.

LightWave Revised

LightWave and its accompanying Modeler are the sections of the Toaster with the most improvements and new features. While LightWave 2.0 was one of the best 3-D programs ever for the Amiga, the additions in LightWave 3.0 make it a contender as one of the best 3-D programs on any platform at any price.

The layout screen (where animations are created) is now the main screen, with the other parts of the interface represented by buttons at the top. Clicking on these brings up different pages where many LightWave options are controlled. LightWave still uses a keyframe method to create animations, but with a new ability to scale or shift the keyframes, which makes it much easier to adjust and fine-tune animations—a real time-saver. Moreover, LightWave now creates visible motion paths in the layout window,



The Toaster's interface sports new, innovative options.

thereby making precise object choreography easier.

Many new mapping options are available, including the use of maps for specularity, diffusion, and luminosity. There's also an amazing new mapping type called displacement mapping, previously available only on high-end systems. This map actually alters the shape of the object you apply it to, creating effects like an actual 3-D bumped object, objects that ripple like cloth, and many other effects. You can save displacement-mapped objects in their transformed shape and load them into Modeler for more alterations.

Another amazing addition is a new object-animation feature called Bones, which, when applied to an object, causes the object to move and rotate in relation to the position of the Bone. You can save these movements as keyframes and then animate them, thus creating very lifelike movements that are well-nigh impossible with other currently available animation techniques. Users specializing in character animation are sure to appreciate this feature.

The Lighting menu contains a new shadow-mapping feature that creates shadows without using the Trace Shadows option. Shadow maps not only render much faster than ray-traced shadows, but they also have soft edges, giving a more realistic appearance. Use them with caution, however, for shadow mapping devours generous portions of RAM. (*Editor's note: For readers who would want to increase Toaster-usable RAM on their systems, DKB Software's 3128 RAM Board ($374.95) is currently the only Zorro III board we're aware of that works with all Toaster 4000-equipped A3000s and A4000s.*)

The Lights menu also contains a feature that may become one of the most over-used effects of all time: Lens Flares. ►

Incredibly easy to set up (just click on the Lens Flare button) and use, Lens Flares creates an interesting special effect that's best used in moderation, as the manual cautions.

Other new features that the Renderer now supports include user-adjustable antialiasing, which greatly improves image quality. Frames rendered in medium resolution with antialiasing look as good or better than images rendered at higher resolutions. Other new options include Motion Blur, Field Rendering, and Depth of Field. LightWave 3.0 renders faster than the previous version, especially on a 68040-based machine. Of course, using options like antialiasing and others will slow down rendering, but the times are still acceptable, and the quality is more than worth it.

With the Toaster 4000 at home in an Amiga 4000, new features are called into play, including the ability to create AGA animations in LightWave that you can then play back from the Switcher. These are created in either low or medium resolution, but only the low-res versions are guaranteed a true 30-frames-per-second playback. Because the animations are limited to low resolution for smooth playback and use large amounts of RAM (an 18MB machine can play back approximately six seconds of animation), real-time playback is virtually limited to generating previews. In most production environments, you need to re-render animations at higher resolutions and record them via single-frame control or some similar method.

Remodeled Modeler

The modeling section of LightWave retains the familiar interface, but now sports many new features, prominent among which is direct importation of Postscript Type One fonts into 3-D objects. Choose the font, type in the appropriate text, and a model is generated. You can modify the text (or any other object) with the new Bevel option, a great feature that anyone who creates "flying logos" will appreciate.

Modeler also has other new object-creation tools, such as path extrusion. Instead of straight extrusion along an axis, the extrusion can follow a motion path created in LightWave's layout window. There's also an option called Rail Extrude, which uses one or more paths or curves to create unique effects difficult to replicate with traditional modeling techniques.

The program now supports long-sought-after Spline Curves. After defining and connecting a series of points, you define control points, and the line adjusts into a smooth, flowing curve, thus allowing you more easily to create organic shapes and objects. The ability to create models with both splines and regular polygonal techniques opens up many new possibilities.

Several Boolean operations are also now available, enabling you to drill into objects or cut pieces of them away, create embossed patterns, and seamlessly merge objects together. The Boolean operations are both easy to use and to set up, employing the different layers in Modeler. This is a major feature that Modeler has previously lacked, so it's great to finally see it here.

Is LightWave/Modeler missing anything? Well, one welcome addition would be a stand-alone rendering package to make easier the rendering of scenes on multiple machines. The cur- ►

rent necessity of buying a Toaster for any machine that is going to be rendering (even if that's the machine's only function) is a problem. Many other 3-D programs have stand-alone rendering engines, so let's hope that NewTek soon follows suit.

UNCHANGED TOASTERPAINT

You'll notice that I have not discussed any of the new additions to ToasterPaint, often regarded as the Toaster's weakest link. That's because it's the same version, despite a rumored revision. There's not even a change in the 4000 version that would at least allow painting on an AGA screen. With all of the other advancements in this package, why ToasterPaint continues to be ignored is an embarrassment and a mystery.

There is one other problem with the Toaster 4000 package—the manual. A complex piece of equipment with numerous options, the Toaster 4000 would benefit from a comprehensive manual. Unfortunately, although it's huge, the one supplied seems like a rush job, falling short of covering all the bases. It gets off to a good start, but a lack of detailed information is soon apparent, particularly in the LightWave section. The organization and proofreading are also second-rate, especially in the tutorial section, and more comprehensive tutorials should be included. Lastly, for a manual of such gargantuan proportions, the lack of an index is deplorable.

FINAL CONSIDERATIONS

The Toaster 4000 is a vast improvement over earlier versions and has become increasingly popular among video and 3-D animation professionals. A few niggling problems and oversights aside, NewTek deserves credit for assembling an ingenious array of hardware and software. Color effects are improved, the new CG is much easier to use, and LightWave is more amazing than ever. Current Toaster owners should consider upgrading, and NewTek has several different software and hardware upgrade options available.

If you don't already own a Toaster, think about basing the Toaster system around the Amiga 4000, as the additional horsepower of the AGA chipset is the only way to access the new color-switcher transitions.

—Dave Thomas

GFXCAD 3000

***Grafx Computing*, 2-D version: $359; 2-D/3-D version: $649**

All Amiga models.
Hard-drive installable.
Copy-protection: Hardware dongle.
1.3/2.0/3.0 compatible.
Accelerator compatible.
***Minimum system*: 3MB.**
***Recommended system*: 3MB or more, 68020 or faster accelerator, flicker fixer or deinterlacer, hard disk.**

Computer-aided design program.

Computed-aided design, better known as CAD, is well represented on the Amiga in the form of the fast, powerful program GFX-CAD 3000. Four CAD programs in one, GFX-CAD 3000 comes with the basic drawing engine called XCAD3000, which consists of both 2-D and 3-D drafting modules. XShell and ZShell, two custom icon-menu interfaces for each module, constitute the remainder of the package. A stand-alone 2-D version is also available.

A LOOK INSIDE

This robust product consists of six disks plus tutorial-bearing manuals for both the accompanying 2-D and 3-D programs. GFX-CAD 3000 includes the increasingly popular dongle-in-the-joystick-port routine as a form of copy-protection: Without the dongle plugged into the port, you're unable to save or print files.

GFX-CAD 3000 requires at least 3MB of RAM. Based on my experience, I recommend 2MB of chip RAM, along with the fastest accelerator and as much 32-bit RAM as your computer budget allows. Further down the priority ladder, a large-capacity hard drive, a screen deinterlacer, a large multisync monitor, and a quality color plotter would nicely complement the program.

When I began using its forerunner, XCAD Designer, in 1989, it was a fast, powerful CAD package, but a text-menu interface made command entry cumbersome. The evolution of the program has resulted in a new shell-like interface for each drafting module. This same interface also makes use of menus containing small icons, and you can link an XCAD command to each icon, permitting new levels of high-speed command entry in drafting and modelling applications.

Both modules use a verb-noun-modifier command syntax to draw entities, which include any line, string, arc, text, dimension, and so on. Typical commands appear as:

```
DRAW LINE
DRAW LINE Rectangle
DRAW LINE Parallel
```

"Idents" is short for "Interactive Digitize and Entity Selection," the method of user input when executing commands.

To draw and select entities, just click the mouse while the cursor is in the drawing window, or click on coordinates or next-point options. You can also enter commands, coordinates, and next-point options using the keyboard. Help with any command is available by typing the command followed by a question mark.

DRAWN TO SCALE

GFX-CAD's XShell 2-D module uses standard architectural drawing tools with scaled viewports to draw in. Each drawing can have up to 32 independently scaled viewports. Standard viewports include Section and Detail options, among others, and scaling of 1/8, 1/4, and 1/2 inch to the foot. The program also supports metric-scaled and user-defined viewports.

When this module loads, the screen, opening in 700×470 overscan mode, contains a main drawing window, a command window, and two of the eight available icon menus. On the far right is the Vector menu, where all the basic drawing commands reside. These provide for standard CAD drawing options, such as lines, arcs, circles, splines, ellipses, rectangles, strings, and many others. This menu also allows detailed editing, with options for trimming and breaking entities, as well as for intersecting entities or groups thereof.

A Base icon menu at the bottom of the screen controls many important view-manipulating options. You'll find essential CAD tools, including next-point options, editing and basic layer and depth commands. Some view commands are Zoom All, Zoom Window, Pan (panning in eight preset directions is possible), and Redraw Display. You can execute these view commands singly or within another command. Powerful editing is quickly available via commands called Move, Move/Copy, Scale, Scale/Copy, Delete, Mirror, Mirror/Copy, Rotate, and Rotate/Copy.

Designers will delight in the wide range of next-point options, which are broken down into End, Mid, Intersection, Near, Reference, Origin, Location, Absolute x and y, Increment x and y, Generate, and Chain. An example of

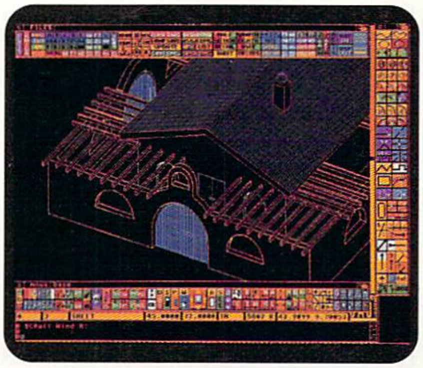
their use would be in drawing a line from the end of one line to the midpoint of another, or from an intersection of two lines to the origin of a circle or arc.

Basic layers, depths, and colors are also controlled from the Base menu, as are all of the other icon menus. These include Display, which allows for fine control over the 256 possible layers and up to eight depths; Files, for all aspects of file and viewport management (including Aegis and DXF support); and Text and Dimension, for control of text, labeling, and dimensioning.

GFX-CAD has true autodimensioning as well as "stretchable" dimensions. You can precisely control just about every aspect of text and dimension creation.

Most of today's genre of CAD programs, including GFX-CAD, make use of predrawn symbols, which are parts that you can add to any drawing.

Many powerful options are available from the Symbols icon menu. You can create and modify symbols as well as link text and numbers to them via attributes. This is useful for generating parts lists, bills of materials, and other reports. Hierarchical family structures are also



An actual building drawn with GFX-CAD.

available from this menu. You can link, unlink, and verify families of entities.

The Pattern menu controls the drawing of polygons, crosshatching, color fills, fill and line patterns, line width, and type. This menu can add many artistic touches to presentation drawings and perspectives imported from the 3-D module.

You use the Output menu to control pen plotting and raster (bitmapped) plotting. Among the plotters supported are Calcomp, Kyocerra, Benson (this is also for vinyl-sign cutters), Houston, and the industry standard HPGL (Hewlett-Packard Graphics Language). There is also support for the PLT: device, a public-domain AmigaDOS device used to direct an HPGL plot to any Preferences printer or to the current screen. For raster plotting, you can choose from HP Laserjet (will also output to the HP Paintjet), Epson, Mitsubishi, and Xerox. An IFF file can be printed on any Preferences printer, and graphics tablets are also supported.

Finally, the 2-D module has its own macro language, called XMACRO, which effectively catapults GFX-CAD far beyond other Amiga CAD programs and even beyond many of those on MAC and Windows platforms. To put it to the test, I wrote a parametric stair-design macro with this language. I input the floor-to-floor height, width of the stairs, and the number of risers. XMACRO automatically drew my stair outline. This is a tremendous time-saver.

Multiple Perspectives

GFX-CAD's ZShell 3-D is a powerful surface-modelling program. The concept of predefined views (top, front, right, left, ►

and bottom) permits an associated construction plane (CPL). This feature allows drawing with horizontal and vertical X and Y axes and a Z axis in and out of the screen. All these perspectives are present, no matter which view you are working in.

You can draw in 3-D space using lines, strings, arcs, circles, surfaces, surfaces of revolution, surfaced planes, points, and projected surfaces and their lines. You also can draw directly in a perspective view.

When this module first opens, it displays a drawing window, the command window, a Vector icon menu, and the Base menu, just as in the 2-D module. This module also supports standard Amiga pull-down menus. Screen resolution is user-definable, requiring the hardware to support non-standard resolutions.

The Vector menu controls all drawing, editing, surfacing, next-point, and filter commands. Among the editing commands are Move, Move/Copy, Scale, Scale/Copy, Break, Mirror, Rotate, and Delete. Another powerful 3-D command is Draw Srev, with which you can sweep a 2-D entity around a pair of 3-D vectors and come up with cones, spheres, domes, and other precise 3-D shapes. With the Add XCAD or Input DXF command, you can import 2-D drawings, which you can then project into 3-D space with surfaces and depth.

I routinely import all the exterior elevations of a building, give them depth and surface, and assemble them into a model. I then draw roof surfaces using the Draw Splane command. This leaves me with a 3-D model I can quickly view from various vantage points with just a click of the mouse.

The Base icon menu controls all display, viewing, coordinate, grid, color, layer, information, and rendering commands. With a simple click of the mouse you can view a 3-D model from the top, side, front, back, and below. You can zoom in and out, redraw the screen, and pan with just a click. Many of the same 2-D next-point options are available.

GFX-CAD (3-D) supports over two million layers. Judicious layering is very important to the ease with which a model can be created. Simple color or gray-scale rendering is supported, but only for checking objects for correct surfaces and so on.

It is assumed that you will export to Imagine or LightWave for final rendering. Drawing management, AutoCAD 3-D DXF import and export, Imagine export, Symbols, and HPGL output are all controlled by pull-down menus.

3-D symbols are very powerful. You can import any previously created 3-D object into your current 3-D world. If you have Inter-Change+ with DXF converter, you can access a multitude of 3-D objects in the public domain and disk collections. Also included is an ARexx port that allows total control of the 3-D module from other programs, and if you have William Hawes' WShell2.0, you can control the 3-D module from the 2-D module.

Conclusions

Without reservation, I regard GFX-CAD 3000 as the strongest Amiga version of the XCAD products to date. For a frame of reference, the PC industry's standard package of AutoCAD12, 3-D Studio, and AME (Advanced Modelling Extension) costs over $8000 while performing at no higher level than GFX-CAD 3000 and Imagine2.0, a combination which cost around $800. That difference would leave plenty of cash for other software and hardware investments. GFX-CAD 3000 opens its power to you as your skills increase.

—Tom Barker

LAN Rover

ASDG, $349

Amiga 2000/3000/4000.
Zorro slot connection.
Requirements: Network software.
Installation: Easy.

Ethernet networking board.

ENLAN-DFS

Interworks, $349

All Amigas.
Hard-drive installable.
Not copy-protected.
2.0/3.0 compatible.
Accelerator compatible.
***Minimum requirements*: Ethernet board, cables and connectors.**

Ethernet-based distributable file-system software for peer-to-peer networking.

Until recently, Amiga computers and devices could exist as nodes, or individual stations, on a larger Netware (Novell) network through the use of Ethernet cards and networking software from either Oxxi or Commodore. Nothing's wrong with that setup if you have the resources to get another computer and install a network running Netware.

But most Amiga users' needs for a network usually involve rendering 3-D animations or sharing a large database, so the added expense of an elaborate network system just to share data, disk drives, and printers doesn't make sense. The answer is a peer-to-peer network system, and the software is now available in the form of ENLAN-DFS from Interworks.

Complete Connections

For those new to the networking concept, the idea is to link two or more computers together using dedicated cards and cables so that each system on the network can share devices.

Two types of Local Area Networks (LANs) are commonly used. One utilizes a server station with attached nodes, while the second is peer-to-peer. A network using one or more servers is generally a more advanced system, expensive to set up initially and more involved to maintain. A fast, powerful computer is necessary as a server because it must handle all the overhead tasks of verifying data integrity and resource management.

On the other hand, peer-to-peer networks link two or more computers together, and the overhead tasks are assimilated by each computer. In either case, you must add network cards to both computers, connect them with the proper cables, and install the network software.

Installation

If your networking plans exclusively involve Amigas, the selection process is simple. All you need are Ethernet boards and ENLAN-DFS software for a complete peer-to-peer network. Commodore recently halted the manufacture of its Ethernet boards, but ASDG has picked up the slack and distributes the LAN Rover Thin Ethernet board as an alternative.

The full-size board employs a clean design and fits into any standard Zorro II/III slot. Installation is straightforward, taking only a few moments per computer. To connect the cards, you use T-connectors (not supplied) and coaxial cable. The first and last computers in the line must have 50-ohm terminators attached to the other side of the T-connectors. Make sure you use the proper cable and connectors for an Ethernet network. Do not use video cable, even though the connectors and cable look much alike.

Installation of the ENLAN-DFS software is easy with a simple installation program. It requires only 356K of disk space, and you can use the default directory locations or select your own. ENLAN-DFS uses DECnet protocol, and you can therefore incorporate it into an existing DECnet LAN installation.

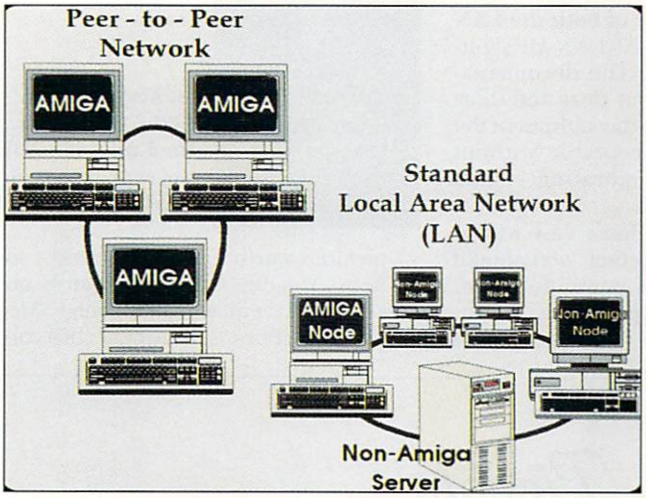
After you have installed the software on each computer, a few more changes are required before the network can function. Each node on the network must have a unique address and associated node

name. You must first edit the Start-DFS file on each machine to enter the calculated node address. Then you assign a name to each node, either by editing or with the SetNodeName utility. Finally, you activate the network by running the Start-DFS script on each node. You can, of course, add this script to your startup.

A Major Network

The last thing you must do is set up the devices the nodes will share on the network. This is accomplished through Export and Import commands and parameters. Export sets up a device to be available to the network; Import sets up a node to use another node's (exported) device.

ENLAN-DFS software accommodates a good deal of flexibility and security for your network. You can set up exported resources with password or read-only protection, and access to imported resources can also be limited to read-only to prevent accidental alterations. Furthermore, you are able to export and import all resources using "public names" to hide the actual internal device names and structures, and you can export "rooted" directories, thereby permitting access only to a selected area of a disk drive.



How a peer-to-peer network (ENLAN-DFS) compares with a typical LAN (local area network).

The requirements for a peer-to-peer network will vary as dramatically as the types of Amiga-based studios. My company designs and renders a lot of 3-D animations and frequently needs to have several machines working long hours on the projects. The ENLAN-DFS solution makes it possible to have the chief animator fine-tuning sections of the animation while other machines on the network are rendering.

The rendered files are stored on the main system hard disk for instant access when we are ready to record the animation to tape. This type of shared project—be it design, document layout, animation, or even multimedia—benefits instantly from a shared-resource network.

Overall, I found the installation, flex- ►

ibility, and ease of use of both the LAN Rover boards and the ENLAN-DFS software to be excellent. The documentation of both is brief, but clear and thorough. In addition, the throughput of the system was quite acceptable without overburdening the operating system with a lot of overhead.

If you are looking for a easy way to link your Amigas together, you should be pleased with this combination of hardware and software.

—Steven Blaize

ColorBurst

18-bit full-color hand scanner.

Migraph, $549

All Amiga models.
2.0/3.0 compatible.
Hard-drive installable.
Not copy-protected.
Accelerator compatible.

***Minimum system*: 2MB.**
***Recommended system*: 4MB, AGA , Amiga, hard disk.**
Installation: Easy.

A picture's worth a thousand words, so here's roughly a thousand words on how to make them with your Amiga. Migraph's ColorBurst is the Amiga's first color hand scanner. True 24-bit hand scanners cost a small fortune, so here is an affordable alternative: an 18-bit scanner that works in 262,000 colors at 200 DPI or 64-color grayscale at 400 DPI.

You could, of course, use a video digitizer like NewTek's DigiView as a scanner of sorts, but it's a hassle to configure and offers only relatively low resolution. Nor would it provide a quick and easy way to scan graphics on a regular basis. Flatbed scanners offer rock-solid, high-resolution scans, but they're both expensive and rare among Amiga hobbyists.

Scan by Hand

The ColorBurst hand scanner is an all-black, attractively styled unit roughly five inches long, with softly rounded corners. It has a four-inch scanning head, a start button on top, and a few controls on the sides—a brightness dial, DPI selector, color-mode, and dither-pattern switches. A six-foot cable connects to a small interface box, which in turn attaches to the parallel port via a three-inch ribbon cable. An AC adapter with a six-foot cable provides the needed power.

You control the scanning software, called ColorKit, through five buttons along the bottom of the screen. To scan an image, you first match ColorKit's settings to the scanner's switches. While the maximum resolution is based on the number of colors you want, the length of your scan is based solely on how much RAM your Amiga contains.

Once these settings are configured, click on the scan button. A requester provides a 30-second countdown while the scanning lamp warms up. When that process is complete, press the button atop the scanner and begin rolling it; the scanning lamp goes out once you've traversed the length requested, or you abort the scan with a press of any key on the keyboard. ColorBurst has no speed indicators on the scanner; instead, you must monitor your progress on your Amiga's screen to ensure a steady speed.

To display the completed scan, simply fetch a screen-mode requester, from which you can ask for any relevant display mode. Thus, AGA machines can display 18-bit images in full HAM8 or any lesser mode. The color settings used during the scan aren't directly related to

how you display or save the final image.

The save requester provides gadgets for all types of IFFs, including AGA modes and IFF24 formats, even if you're not using an AGA machine. This means, for example, that you can create HAM8 images on your A3000 and edit them later on your A4000.

Character Recognition

ColorBurst scanners are bundled with Migraph's OCR Jr. Optical Character Recognition software—a nice combination, because it gives fledgling desktop publishers the capability of scanning graphics and converting text all from one box.

OCR is a simple and effective program. Its main screen looks rather like a minimalist version of PageStream, and using the program is a simple matter of scanning in the text, defining "document boxes" around the material to be converted and letting the program do its thing.

Need to scan across a page instead of down? Select the "landscape" option, and OCR automatically rotates the image for you. The program works either automatically or interactively.

In interactive mode, it displays the scanned word along with OCR's best guess. You correct any mistakes as you go along, and you can make OCR "learn" from the experience or just use the corrections (as in cases of smeary scans that you don't want OCR to try to apply in the future). While there are three zoom settings in OCR, I was frustrated by the lack of user-definable zoom levels to help form custom document boxes.

OCR is both easy to use and reasonably accurate. While the occasions are rare when you'll want to set OCR to "auto" and let the program fend for itself, the interactive method is certainly a whole lot faster than typing an entire document from scratch.

What's Wrong with This Picture?

Although the scanner hardware is top-notch and creates wonderful images, the ColorBurst software is a veritable hodgepodge of nonstandard features. Though both ColorKit and OCR use the ASL file requester, little else is standard Amiga fare.

There were, for instance, a few AGA-specific idiosyncrasies. The mouse pointer is big and blocky—not the svelte pointer WB 3.0 is capable of. In addition, the ColorKit screen on my A4000 was always shifted so far to the right that I had to drag it back with the left Amiga-mouse combination in order to see



Get the whole family into the picture with ColorBurst.

the right half of requesters. (Oddly enough, however, this didn't occur on my A3000.) And OCR's custom screen is interlaced on AGA machines.

There are generic problems, too. When you begin to scan, a requester provides a countdown until the scanner's lamp is warmed up. It seemed to work only intermittently until I realized that the timer comes to a grinding halt whenever the screen on which it sits isn't active, so you must keep that "autopointing" mouse pointer over the requester. Even the menus are nonstandard, with "Quit" in OCR located in the second menu column!

Instead of the Commodore installer, Migraph uses a homebrewed one, which provides no icon for the program—you'll have to create your own.

To Buy or Not to Buy

Is this scanner for you? As I've already said, it is an excellent value, but even ColorBurst will not take full advantage of your new AGA machine. HAM8 has the ability to hold significantly more color information than just 262,144 colors, and a comparison between an 18-bit ColorBurst scan and one made with a 24-bit hand scanner will show some difference.

For most applications, though, that's not particularly important. If you print hardcopies in 16 shades of gray, ColorBurst's 64 shades is already, in some sense, overkill. Video images look great in 262,000 colors, and only under the scrutiny of a high-resolution RGB display will the lack of color data be apparent.

ColorBurst is a fine product that brings high-color hand scanning to the Amiga masses. The scanner produces accurate, clean images in a wide variety of modes, from nearly true-color all the way down to line art and OCR-ready imagery.

I was not happy with the software, which is sure to tax the patience of anyone who must use it daily, but ColorBurst is a great value nonetheless. For my desktop-publishing needs, ColorBurst is a bargain.

—Dave Johnson

M1230 XA

***MicroBotics,* from $399**

Internal slot connection.
3.0 compatible.
Installation: Easy.

A1200 68030 accelerator, 68882 math coprocessor, RAM expander, and real-time clock card.

The Amiga 1200 is no slouch in the speed department. It's roughly three times faster than an A500 or A2000 straight out of the box, and becomes over five times quicker once you add some Fast RAM. That's enough oomph for many tasks, but once you delve into projects like 24-bit image processing, ray tracing, or desktop publishing, what may have seemed fast the day you traded up from your A500 now seems sluggish.

If you have the need for speed, MicroBotics has a solution that can make your little A1200 perform almost on par with an A4000.

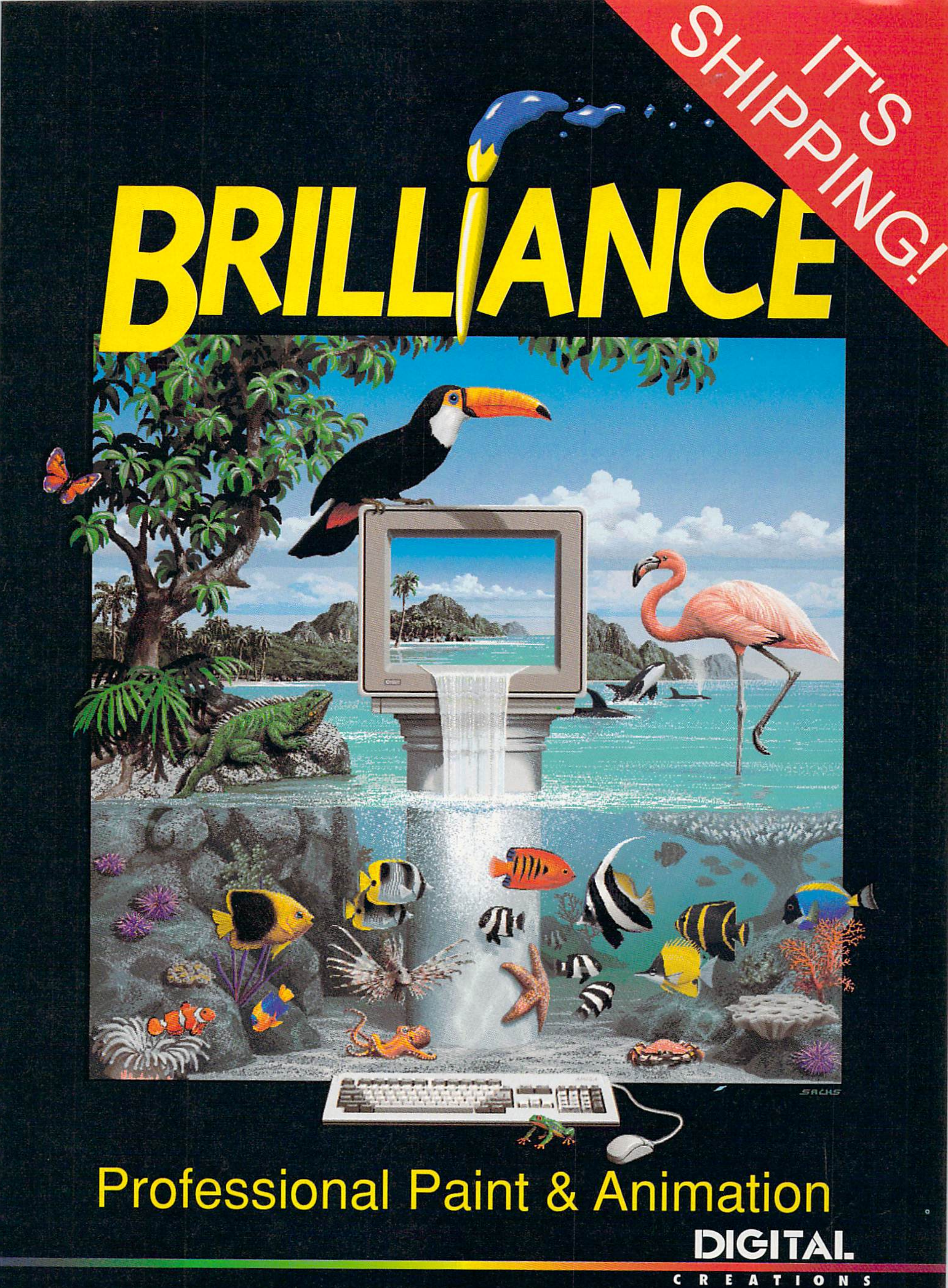
Low-Buck Power

When the A1200 first shipped, some wondered just how much could be crammed into the tiny trap-door expansion slot under the machine. A lot, thanks to the ingenuity of companies like MicroBotics. The top-of-the-line M1230 XA I evaluated sported a 50-MHz 68030, a 50-MHz 68882 math coprocessor, 8MB of 32-bit Fast RAM, and a battery-backed real-time clock—all on a board about a quarter of the size of the typical Amiga 2000 accelerator.

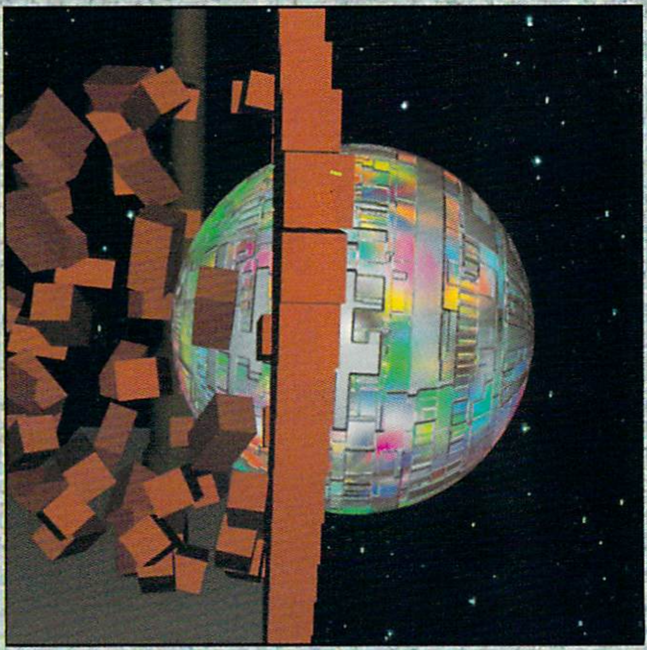
Installation is a simple process. Just remove the plastic cover under your A1200 and push the M1230 XA onto the expansion connector. As with all internal expansion cards for the A1200, it's a tight fit, but with a little patience the board slides easily into place.

The next step is to run the SetXA utility to set the processor speed and type, as well as the amount and speed of RAM present. These values are stored in nonvolatile memory on the M1230 XA, saving you the hassle of messing with switches and jumpers. (There are two jumpers on the board; one is used if you install a math chip that runs at a different speed than the processor, and the other is a Test

Continued on p. 66.


IT'S SHIPPING!
BRILLIANCE
Professional Paint & Animation
DIGITAL
CREATIONS





One, Two, Thre

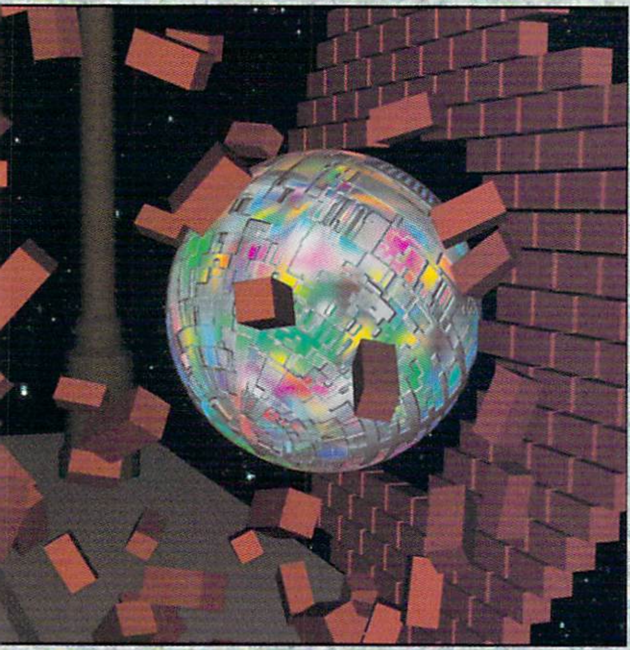
State-of-the-art 3-D software breaks through barriers, giving you more modeling, effects, and animation capabilities, and raising your expectations ever higher.

BY STEVEN BLAIZE

THE FIELD OF Amiga 3-D graphics and software today comprises some of the most powerful, professional systems available on any platform. Amiga developers have brought to your desktop the revolutionary changes happening on high-end systems such as Silicon Graphics and Sun...and then some.

As few as four years ago we were happy with a few tools to create 3-D objects, select color and surface characteristics, and then move either the objects or the viewpoint to create animation; the final image was rendered in a maximum of 4096 colors. Today, our expectations are being filled with hierarchical and skeletal control animation, 32-bit alpha-channel rendering, real-time wireframe modeling, inverse kinematics, particle systems, Boolean operations, lens flares, and much, much more. If you don't understand all these terms, please refer to the sidebar glossary. Meanwhile, let's examine the programs that represent the state of the art in Amiga 3-D graphics and animation: LightWave, Real 3D 2.0, Will Vinton's Playmation, Aladdin 4D, Caligari 24, and Caligari Broadcast.

We were not able to report on Imagine (Impulse) and 3D Professional (Progressive Peripherals & Software). Both Impulse and PP&S were reportedly updating their products as this article was being written (Imagine 3.0 may be ready by the



Particle animation is a feature that sets Real 3D apart. Once the ball hits the wall in this sequence, each particle (brick) is subject to gravity or any other force(s) you might want to impose.

e...More!

ime you read this), but we were unable to get details. And while programs such as Sculpt 4D (Byte by Byte) are still being sold, they have not been updated in years, and do not provide the output we've come to expect. (*For details on contacting developers of the products covered, see the "Manufacturers'/Distributors' Addresses" list on p. 90.*)

Common Basics

I'll begin by giving you an overview of these 3-D graphics and animation systems (I refer to the packages as "systems" because each provides all the functions required for completing an animation). First, there is object creation or modeling, and once you have created an object, you must give it surface characteristics. You then place your objects in a void that can have its own characteristics; next, you add lights and position camera views. Movement and modification of objects, lights, or views can all be incorporated into your final animation. The final and most important phase is the rendering of the picture; each frame or field needs to be rendered in order to create a complete animation.

To let you view the three-dimensional space in which you are working on the two-dimensional surface of your monitor, each program provides different views. Some, such as LightWave and Playmation, divide your monitor into quadrants for top, side, front, and perspective views. Others, such as Caligari and Aladdin, provide a near real-time view of your space from all perspectives. Real 3D allows any number of views at any size.

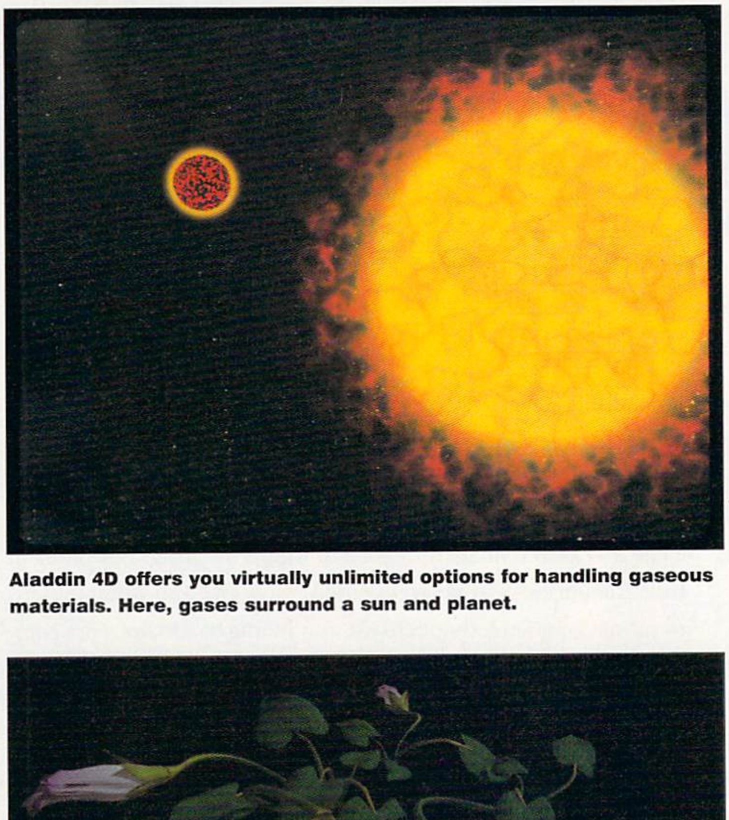
All the systems have very flexible tools. (See the table entitled "The 3-D Differential" for a look at where the programs differ in nine categories.) For object creation, most give you instant access to simple geometric shapes to use as building blocks for more complex objects. A lathing tool lets you draw a 2-D profile and spin it to create an object. You can also build objects by extruding 2-D shapes; most systems allow extrusions along a path as well, and a few extrude by point selection. All give you bitmapped texture maps; most provide procedural texture maps, bump maps, reflection maps, transparency maps, and others. All the programs let you apply textures of different types to a single object, but only Aladdin and Real 3D let you combine multiple textures of the same type (two transparency maps, for instance). Each mapping technique gives you a great deal of latitude in defining surface characteristics of the objects.

The rendering engines within these systems vary in speed and ability. Some are ray tracers that can generate real-world reflections and refractions (for surfaces such as glass); others use specialized methods to simulate shadows and reflections and gain rendering speed. A couple let you select the method, quality level, and so on, ►

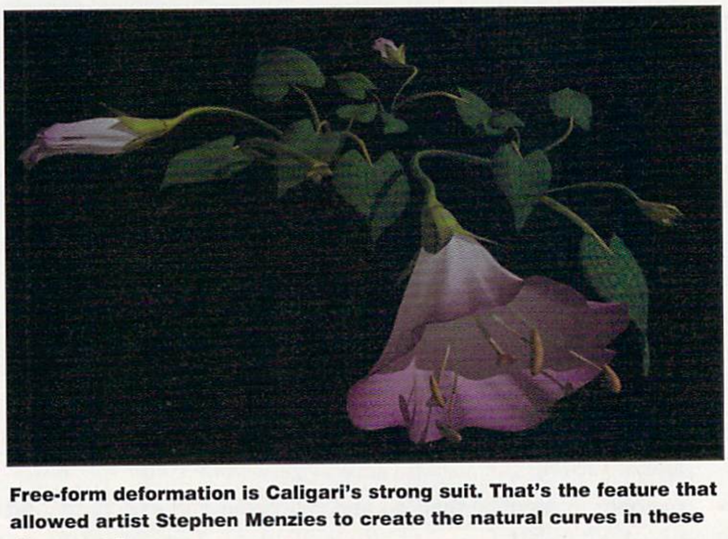
but each notch up in realism adds rendering time.

It's impossible to compare the programs' rendering rates in a meaningful way; there is no comprehensive, fair method to do so because not all have the same object compatiblity and rendering capabilities. Each company has selected areas of the rendering engine to optimize. For example, some systems are optimized to render basic geometric primitives faster than free-form models. Each optimization is welcome, but rendering times can be dramatically biased depending on the specifics of the scene. Take this as a given: You'll need as much 32-bit RAM, as fast a processor, and as much hard-disk space as you can afford for decent speeds. Every program runs faster with more RAM and many have special code for the 68040 processor.

There is not enough room here to detail all the features and capabilities of each program, so the profiles emphasize things that differentiate them. Distinguishing characteristics include unique abilities as well as missing features that are generally assumed to be included with 3-D packages. Each program is a high-quality professional animation system, but approaches 3-D in its own way and with a distinct user interface.



Aladdin 4D offers you virtually unlimited options for handling gaseous materials. Here, gases surround a sun and planet.



Free-form deformation is Caligari's strong suit. That's the feature that allowed artist Stephen Menzies to create the natural curves in these vines and flowers.

Aladdin 4D

Aladdin 4D ($499, ***Adspec***), has an unusual interface and some powerful and interesting rendering capabilities. All work is done in one module with a single viewing port. You can change the view from front, top, side, or camera, in either perspective or parallel. The right side of the screen contains two columns of poorly designed icons that control most movement and shaping functions. While it allows you to hide selected polygons and objects as other programs do, Aladdin 4D also uses multiple creation spaces within the same project. This lets you quickly move entire sections of an animation to another space for fine tuning.

Probably the program's most unique feature is its creation of gases. You have some flexibility in shaping the gases, but your options are virtually limitless regarding color, density, turbidity, animation; you can even apply animated bitmaps to a gas! About the only thing you cannot do is move the camera through gas.

Surface-attributes handling is very powerful but a bit awkward. You set entry and exit attributes, as well as the timeline. Attributes are saved in lists that can be applied to other objects within the scene. If each object attribute is different, however, you end up with long lists. Aladdin 4D handles most general types of texture mapping. Its smooth control of morphing surface attributes is excellent; it includes ease in and ease out, although there is no object morphing. Aladdin 4D uses time-slice animation control, so it is relatively easy to stretch or shorten animations. Because the timeline control applies to each object as part of the attributes, however, selective changes can be time consuming.

Version 2.3 includes new procedural textures and is the sole program to allow JPEG-format bitmaps for texture maps. This version also speeds rendering of both shadows and gases, a welcome improvement. While Aladdin 4D uses ray-trace techniques for gases and other rendering, it does not include refractive indexes for creating real-world transparent materials.

After working with the program and watching the four-hour instructional video ($59, ***Adspec***), I certainly feel this is a very capable and powerful system. I also feel, though, that the interface is not intuitive, and this makes for a steep learning curve. The manual includes tutorials but is poorly organized. Finally, this is the only system that does not include simple geometric shapes; every object is created from scratch.

Caligari 24/Caligari Broadcast

Little differentiates **Caligari 24** ($399) and **Caligari Broadcast** ($795), so except where noted, reference to Caligari covers both variations of ***Octree's*** software.

Caligari was the first to use a completely interactive interface that permits you to move freely about your 3-D space. Menus for controlling creation, movement, animation, rendering, and surface characteristics are added or removed in layers across the bottom of your screen. You typically work in one of two spaces, the Ob-

ject Design or Scene Composition area. Object Design is quite good, and includes most tools and a set of primitives. It does not allow extrusion along a path, but its selected-polygon extrusion option can handle similar creation. Caligari's unique Free Form Deformation feature lets you place pliable lattice work around an object and then deform it to fit the lattice. This allows the creation of some very organic shapes. The ability to animate free-form deformations is the most distinctive difference in Caligari Broadcast, besides the mouse-port dongle.

Caligari is not a ray tracer, yet it produces excellent results. It uses cloned objects, shadow-volume calculations, and various shaders (including metal, Gouraud, Phong, and environmental) to speed rendering. Many items within the scene are calculated only the first time the scene is generated, so subsequent renderings are much faster. The interface stresses your viewpoint; numeric input is allowed for precise positioning, but it's a little awkward. Caligari supports only bitmapped texture maps, and cannot morph surface attributes or objects (except animation of free-form deformations). You can wrap animated series of bitmaps to an object, but not as easily as with other systems. While I enjoy its interface, I feel Caligari lacks some important capabilities such as multitasking, which is now expected in 3-D systems.

LightWave 3.0

LightWave 3.0 is a subsystem of ***NewTek's*** new Video Toaster 4000 ($2399) and the Video Toaster 3.0 software upgrade ($795). Its popularity has revolved mainly around the intuitive and powerful user interface of the animation Layout. There are two modules in LightWave: the Modeler, for object creation, and Layout, for animation work. The Modeler has seen vast improvements from past versions, including use of PostScript fonts, smooth-mesh creation from a maximum of four spline curves, and drilling of objects with other objects. Boolean functions have been added to let you modify objects seamlessly. You also get more than 150 ready-to-use LightWave objects.

LightWave 3.0 can selectively ray trace or not, and includes soft-edge shadows without ray tracing. In addition to almost every type of texture mapping, it offers displacement mapping (which actually alters the polygonal form) and clip mapping (which cuts away sections of the object for proper shadowing). The renderer now supports such things as motion blur, depth of field, and the now very popular lens flare, which reproduces the light glows and rings that happen when a real camera passes in front of a light. (Ironically, most cinematographers avoid this type of artifacting.)

LightWave allows easy stretching of animation segments for individual objects or globally. I also like the control of global fog for underwater effects; however, objects do not have attributes for turbidity and thus you do not have fog objects. Another addition to LightWave is the Bones option, which allows some control over the skeletal shape and movement of an object. While it is very flexible, it offers nowhere near the type of control provided by Playmation or Real 3D.

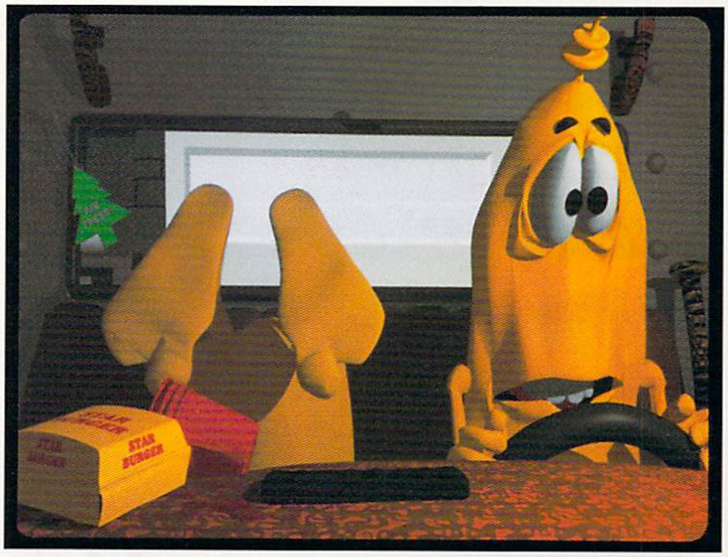
There are few shortcomings to LightWave other than the largest and most expensive dongle of the group: the Video Toaster. Don't get me wrong—the Toaster is an excellent product, but if you are a 3-D producer and want multiple rendering machines, choosing LightWave means buying a Toaster for each computer. This also precludes LightWave supporting any other display boards.

Real 3D 2.0

Real 3D 2.0 ($699, ***Realsoft***), has made some momentous forays in the area of desktop 3-D animation systems. The one-module user interface is customizable with any number and size of viewpoints, object selections, and tool window(s). While Real 3D does not use spline patches like Playmation, it does allow four or more spline curves to create a free-form mesh. The multilayered mapping abilities cover the gamut of texture mapping, with the exception of displacement mapping. Object creation comes from primitives, from scratch, and from excellent Boolean operations. ►



LightWave 3.0 lets you create realistic lens flares—the halos induced by bright light. (Image by Michael Skov of Virtual Image Labs.)



Playmation's bendable splines remove polygons from the picture. No matter how close you zoom in, you'll see no straight lines on the objects' edges. (Courtesy of Bob Terrell and Vince Backeberg.)

A fractal-tree and -landscape generator is included.

Real 3D incorporates features previously available only on high-end workstations. These include collision detection, gravity, velocity, particle systems, and inverse kinematics. The particle systems can be made of any type of object, have animated texture maps, and be influenced by environmental effects such as wind. Inverse kinematics permits the program to calculate realistic skeletal movements when objects are created in a hierarchy with joints. Real 3D also provides its Real Programming Language (RPL), opening the door for third-party animation methods and textures. Real 3D's allowance for multiple cameras is unusual. Think of this as a multicamera shoot of the same animation movements; you can select and include any camera view, all without altering the controlling animation.

Real 3D's thorough documentation includes many tutorials to assist you in learning its complexities. Its index is about the only area that could use a boost.

The rendering engine is a ray tracer and high-quality output takes time, but ray-trace and constructive solid geometry is the only way to accurately render a magnifying-glass lens. Real 3D also requires either a mouse- or parallel-port copy-protection dongle.

Will Vinton's Playmation

Will Vinton's Playmation ($299, ***Hash Enterprises***), has an interface consisting of six disconnected modules. One creates individual segments of an object; another combines the segments into a character and assigns attributes (except bitmapped decals which are in a third module). Another lets you create and modify individual character movement; one more puts all the characters, lights, and camera movements together. Finally, there is the render module.

Playmation is also unique in that objects are created with spline patches instead of polygons. This permits absolutely smooth surfaces no matter how close you get to an object. It also lets you move, bend, flex and mold objects as if they were covered with skin.

Playmation has excellent animation options for objects (characters), giving you complete skeletal control of movement, muscle motion, morphing, and much more. Playmation uses individual channels to manage

The 3-D Differential

TODAY'S 3-D SYSTEMS offer far more features than could fit in a table such as this. What's more, many capabilities, such as object-point editing and hiding, are now considered standard equipment; all current 3-D graphics/animation packages provide them. So, instead of listing each and every feature, I've narrowed the list to distinguishing, documented characteristics to show where the packages differ.

	ALADDIN 4D	CALIGARI 24 / BROADCAST		LIGHTWAVE	PLAYMATION	REAL 3D
General						
AGA support	●	●	●	●	○	●
Copy-protection dongle	○	○	●	●	○	●
Multitasking	●	○	○	●	●	●
Keyboard equivalents	●	●	●	●	●	●
ARexx support	○	○	○	●	○	●
Third-party programming support	○	○	○	◗	○	●
Customizable interface	○	◗	◗	○	○	●
Modeling						
Primitives	○	●	●	●	●	●
Extrusion along a path	○	○	○	●	●	●
Special-purpose extrusions	●	●	●	●	●	●
Boolean operations: drill, add, subtract, join, intersect	○	○	○	●	○	●
Spline-curve patches	○	○	○	◗	●	◗
Spline-curve free form	○	○	○	●	●	●
Organic free-form deformation	○	●	●	○	●	●
Direct font support	◗	◗	◗	PostScript	○	○
Lathe	●	●	●	●	●	●
Fractal objects	○	○	○	○	○	●
Hierarchical-object creation	○	●	●	●	●	●
Surface Characteristics						
UV map	○	○	○	○	●	●
Animated texture map	●	◗	◗	●	●	●
Transparency map	●	●	●	●	●	●
Procedural map	●	○	○	●	●	●
Bump map	●	○	○	●	●	●
Displacement map	○	○	○	●	○	○
Reflection map	●	●	●	●	●	●
Environment map	○	●	●	●	●	●
Texture libraries	●	●	●	●	●	●
Gas—turbidity	●	○	○	○	○	●

ease-in and ease-out of movement, and choreographed skeletal motion can be applied to other characters with the same number of object segments.

Playmation also has a steep learning curve. Its use of spline-patch object creation, an almost singular feature of 3-D systems on any platform, precludes its objects from being used in other systems (although it allows DXF export). Playmation can't import other systems' polygonal objects. Finally, I personally don't feel Playmation's ray-tracer offers the quality of other systems.

FINAL OUTPUT

Trying to cover these excellent, complex programs fairly in one article is difficult. I hope I've provided enough information on each one's strengths and weaknesses to help you make the right decision. While each one is appealing for different reasons, it is true that there is no single package—on any platform—that is the ultimate ►

	ALADDIN 4D	CALIGARI 24/BROADCAST		LIGHTWAVE	PLAYMATION	REAL 3D
File Formats for Maps						
IFF	●	●	●	●	●	●
Framestore	○	○	○	●	○	○
JPEG	●	○	○	○	○	○
TARGA	○	●	●	○	●	●
PCX	○	○	○	●	●	○
Alternative File Formats for Objects						
DXF import	○	●	●	●	○	●
DXF export	○	○	○	○	●	○
Other object formats	●	●	●	●	○	●
Rendering						
Ray trace	◗	○	○	Selectable	●	●
68040 optimized code	*	○	*	●	○	●
Shadows	●	●	●	●	●	●
Soft shadows	○	○	○	●	◗	●
Alpha channel—32-bit support	○	●	●	●	○	●
Background picture	●	●	●	●	●	●
Foreground picture	●	●	●	●	○	○
Lens flares	○	○	○	●	○	○
Fog/haze effects	●	○	○	●	●	●
Motion blur	○	○	●	●	●	●
Field rendering	○	○	●	●	○	●
Depth of field	○	○	○	●	●	●
Extended-Display Devices						
Video Toaster	○	○	○	●	○	○
Harlequin	○	●	●	○	○	●
IV-24	○	●	●	○	○	○
OpalVision	●	●	●	○	○	●
Targa	○	●	●	○	○	○
Firecracker	●	●	●	○	○	○
Retina	●	○	○	○	○	●
DCTV	●	●	●	●	○	●
File-Save Formats						
IFF	●	●	●	●	●	●
Targa	○	●	●	○	●	●
Framestore	○	○	○	●	○	○
Animation						
Spline paths	○	●	●	●	●	●
Hierarchical key-frame animation	○	○	○	●	●	●
Key-frame animation	●	●	●	●	●	●
Object morphing	○	○	◗	●	●	●
Time stretch/squeeze	●	●	●	●	●	●
Direct single-frame control support	○	●	●	●	○	◗
Ease-in/ease-out	●	●	●	●	●	●
Multiple camera views	○	○	○	○	○	●
Particle system	○	○	○	○	○	●
Inverse kinematics	○	○	○	○	○	●
Skeletal control	○	◗	◗	◗	●	●
Collision detection	○	○	○	○	○	●
Morphing surface textures	●	○	○	●	●	●

Key:
● = full implementation of this feature ○ = program does not handle this capability ◗ = partial or limited support
* Support ensured by manufacturer, but *AW* was unable to confirm during testing.

3-D animation system. For example, while Playmation is available for Mac and Windows (and soon for SGI) and Real 3D should have a Windows version available by print time, none of these systems has network-safe or stand-alone render engines available. One thing is certain, the 3-D market has exploded...and as abilities continue to increase, so will our expectations. ■

Steven Blaize, owner of the multimedia-presentation company Creative Fire, is a consultant and writer.

3-D Glossary of Terms

Confused by the terminology of 3-D graphics? Look here.

32-BIT ALPHA-CHANNEL RENDERING—a mode that uses 24 bits to produce images with 16.7 million colors, and another eight bits (256 color levels) to allow transparency. This type of rendering is useful for special effects when overlaying images on a background.

ATTRIBUTES—characteristics such as color, refraction index, transparency, and so on, that you can assign to an object.

BOOLEAN OPERATIONS—features that let you create new objects by intersecting existing ones. You can join, cut away, drill holes, and more. For instance, you can use a tube to cut a tunnel through a cube.

BUMP MAP—an image map that uses color values to determine height; gives the appearance of peaks and valleys to a surface.

CAMERA—the point from which you see your 3-D scene.

COLLISION DETECTION—a program's ability to recognize the collision of objects on intersecting paths and apply real-world effects to them.

CLIP MAP—a map that cuts away portions of an object for the purposes of shadow casting and so on.

DENSITY—a feature most often used to control the amount of light that passes through a translucent object. Can be used with turbidity to produce gas, fog, and cloud effects.

DEPTH OF FIELD—a standard photography term referring to the area of a scene in which objects will appear focused in the final photo—or rendering, in the case of 3-D software. (Objects outside this area appear fuzzy.) Some programs have added this real-world artifact to permit "photo-realistic" renderings.

DISPLACEMENT MAP—an image map that uses color values to create bumps and pits in an object's surface. Unlike bump mapping, displacement mapping alters the polygons that make up the object's surface and changes the object's shape instead of just its appearance.

DXF—the file format used by Autodesk's AutoCAD, an industry-standard CAD program for the PC.

EASE-IN/EASE-OUT—realistic graduated motion, as with a train easing out of the station, picking up speed along the track, and then braking to ease into the next station.

EXTRUSION—a process that can turn a 2-D outline into a 3-D object by increasing its depth (thickness) to any amount.

EXTRUSION ALONG A PATH—this feature lets you extrude your object along a path in 3-D space to produce a snaking effect.

FRACTAL GENERATION—the ability to create natural objects, such as landscapes and trees, using patterned randomness.

GOURAUD SHADING—a method by which the program reads intensity differences between the polygons that make up an object and then interpolates to produce a smooth surface.

HIERARCHICAL CONTROL—control over "child" objects via "parent" objects. For instance, if a figure is made up of small objects linked in parentage, raising the thigh (parent of knee) would raise the knee.

INVERSE KINEMATICS—a technique used to calculate position and motion of linked objects based on starting and ending points that you provide. For example, inverse kinematics could determine movement of hand, wrist, arm, elbow, and shoulder for a finger pressing a button.

JPEG—a graphics-file compression standard named for the Joint Photographic Experts Group.

LENS FLARES—halos that appear when a real camera lens passes in front of a light.

MAPPING—wrapping the surface of an object with an image or algorithm definition to impart a certain desired appearance. There are several types of maps you can wrap to objects, including procedural, reflection, transparency, clip, displacement, and bump maps.

METAMORPHOSIS—transmuting one 3-D object or attribute into another.

MOTION BLUR—blurring an image to create the illusion of motion.

PARTICLE SYSTEM—a group of individual particles (such as snow flakes) moving under control of external force (such as wind).

POINT SELECTION—allows you to isolate an operation to a single point or points, instead of affecting an entire object. This lets you stretch just the nose, for instance, instead of the whole head.

PHONG SHADING—an algorithm that, like Gouraud shading, helps smooth the surface of a polygonal object. Calculation is done on a pixel level, however, instead of on a polygon level.

PROCEDURAL (ALGORITHMIC) TEXTURE MAPS—most object mapping uses bitmapped images to create texture; procedural maps use algorithms to calculate the image that will be wrapped to the surface.

RAY TRACING—a rendering method that creates the final picture by following light rays through the scene until they reach the observer's viewpoint (camera). The program calculates shadows and refractions using the laws of physics; the results can be very realistic. Ray tracing can be time-consuming because of all the calculations involved, so some programs use methods to approximate the results of ray tracing.

REAL-TIME—real-time feedback from a program means not having to wait before you see your results.

REFLECTION MAP—an image map used to control the amount of light and the colors that will be reflected from an object's surface.

REFRACTIVE INDEXES—specifications that determine the degree to which light rays will bend (refract) as they pass through objects.

RENDERING—the generation of a 3-D scene, containing all its objects.

SKELETAL CONTROL—the use of a simplified object (such as a stick figure) to control the movement and interaction of a more complex group of objects (such as a human form).

SPLINE—a way of connecting points with a smooth curve.

SPLINE PATCH—a smooth mesh that forms the surface area of an object created with splines. Spline patches are an alternative way of creating surfaces, which most programs generate using polygons.

TRANSPARENCY MAP—an image map that lets you make part or all of an object transparent or translucent.

TURBIDITY—a control for the amount of randomness applied to light passing through an object. Often used with controls such as density.

UV MAPPING—also called spline mapping or decaling, this is the application of spline textures to spline objects. Its effect is seen when you deform or manipulate the mapped object; the picture map adjusts to fit the curve without becoming distorted.

WIREFRAME—the polygonal or spline outline of an object's shape. Viewing objects in wireframe mode is quick because it does not require calculation of surface attributes, lights, and so on. □

Animate Without the W·A·I·T

There are several ways to view high-color animations and graphics-enhanced videos—and commit them to tape—without resorting to the time-consuming process of single-frame recording.

By Geoffrey Williams

DOES TRASHING THE heads of a $15,000 video deck sound like fun to you? Do you enjoy rendering for hours, only to have a minor tape flaw force you to start over? Do you thrill to waiting forever before you can view your high-resolution animations—while the tape endlessly prerolls, advances, and backs up? If so, you love single-frame recording, in which frames of animation are recorded one at a time to videotape.

Single-framing is the traditional method for getting the highest-quality output of high-resolution animations and rotoscoped video. And it's true, there are times when it's the only way to go (see the sidebar, "The Singular Solution"). But I know of no one who really enjoys the process—so what are the alternatives?

Until recently there weren't many, but recent advances in Amiga technology have opened more possibilities. There are now many ways that you can play full-color animations (that is, sequences using the complete color range available from NTSC) in "real time" (around 30 frames per second [fps]—or enough to produce smooth motion) directly from the computer.

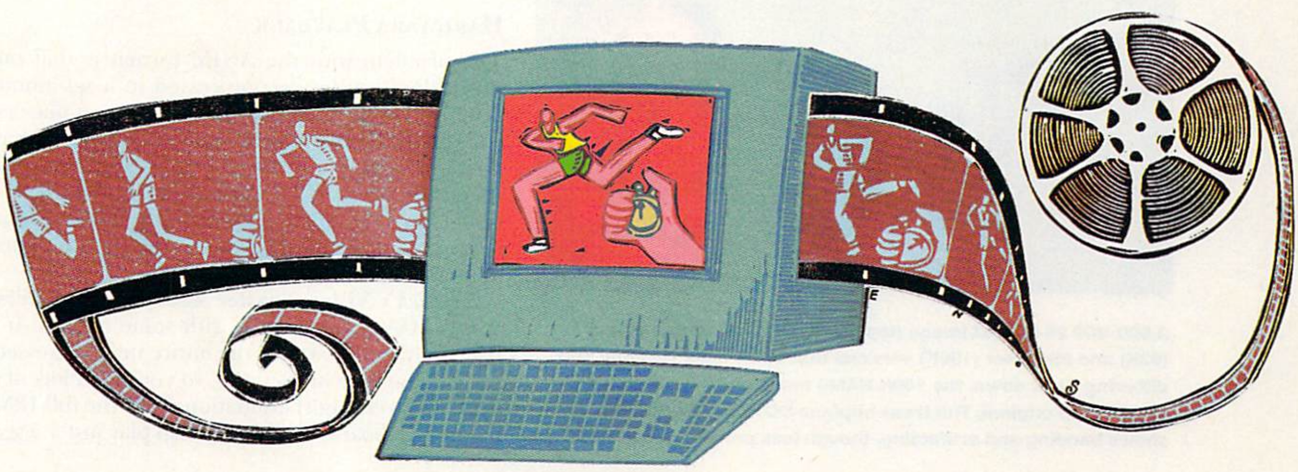
From the Beginning

The Amiga has always been able to play animations, but to achieve acceptably smooth motion, you had to use either lower-resolution HAM or higher-resolution 16-color format. Neither was completely satisfying.

With the introduction of **DCTV** ($495, ***Digital Creations***), it became possible to play full-color, TV-quality NTSC sequences. DCTV images have some artifacting problems and tend to look soft rather than sharp, but the quality is acceptable for most applications. Broadcast users should run the signal through a TBC (time-base corrector) first, though.

DCTV is well supported by a number of products, notably image processors, and it's easy to use because you can create animations in standard ANIM format that any player or multimedia program can handle.

As with regular ANIMs, you still have speed limitations when a lot of things are moving on screen (in oth- ►



ILLUSTRATED BY RANDALL ENOS

er words, more pixels are changing from image to image, thus requiring more decompression, which makes playback slower). If there is too much movement, the animation slows to a crawl. Even on an Amiga 4000, camera moves with complex imagery produce unacceptable results.

On the A1200 and A4000, AGA animations offer up to 256,000 colors in HAM8 mode. But because an AGA image can be up to three times as large as a comparable DCTV image, the speed problem is worse with AGA animations because they contain so much more information (it is difficult to animate even four-bitplane DCTV animations at full speed).

Comparing DCTV and AGA image quality is difficult because they are so different. DCTV is already encoded into NTSC, and has the same color limitations NTSC does. It has a palette of about four million colors, all of which can be displayed without limitation. AGA has a full 16-million color palette, but only 256,000 colors can be displayed at once.

Even so, a 640×400 screen has only 256,000 pixels so, theoretically, every pixel could be a different color (they can't be in reality, though, because the way HAM8 works, you can't always make dramatic changes in color from one pixel to the next). Because of the greatly expanded color palette, however, fringing is much less noticeable unless you are in Magnify mode. When you are animating, HAM fringing and DCTV aliasing problems are virtually unnoticeable.

The bottom line: AGA images look sharper and a little richer, and creating AGA animations is much easier because you can use programs such as **DeluxePaint AGA** (*Electronic Arts*) or **Brilliance** (*Digital Creations*). DCTV, though, can do complex animations faster.

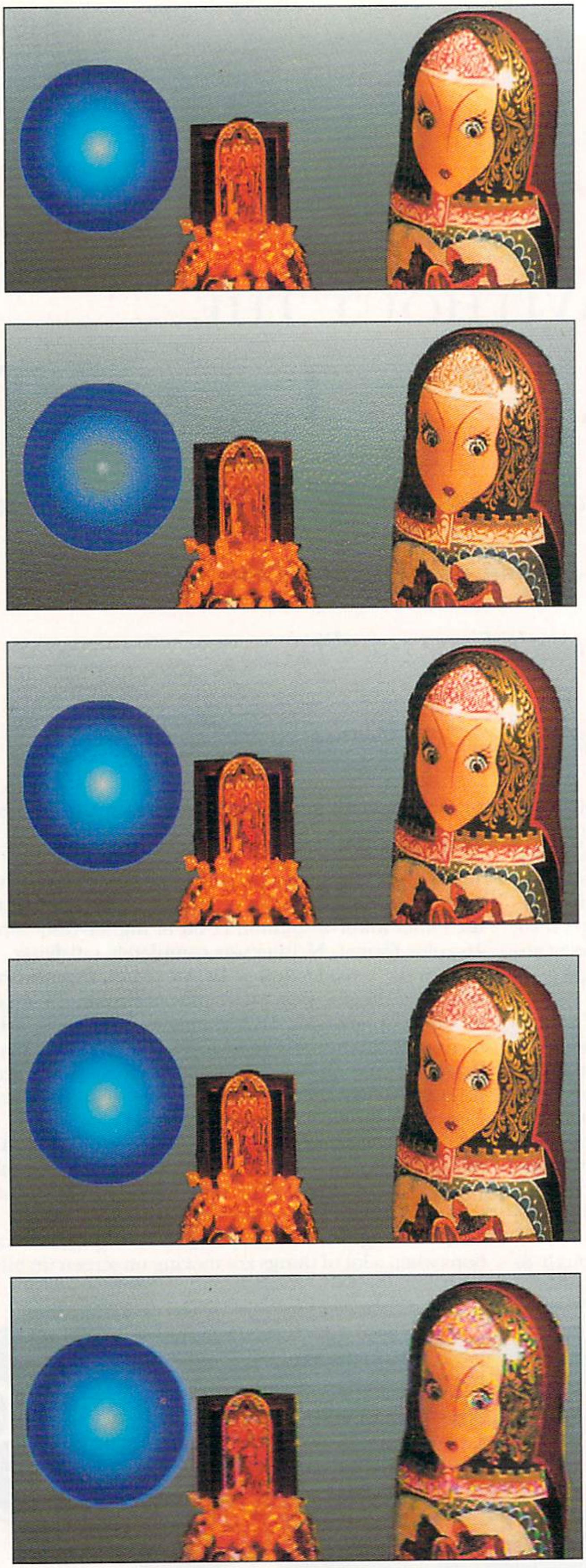
Another display device that supports animation is **OpalVision** (*Centaur,* $699). With it, you can create 24-bit animations at 368×236. The resulting files are quite large, however (over 10MB for 50 frames), and you can expect only about 15 fps on an A3000, and around 10 fps on an accelerated A2000. It also plays 18-, 15-, 12-, and 8-bit animations, with progressively faster speeds, although typically under 30 fps. Playback directly from the hard drive on my 50 MHz '030 with a Quantum 240 hard drive was not very fast. Loading animations into RAM requires a lot of memory, but seems to be the best way to get decent playback speed.

Be aware that there are things you can do to your images to ensure faster playback; see the article "Squeeze Frames" on p. 37.

Hardware Playback

The problem with the ANIM format is that only so much data can be decompressed in a set amount of time, and even if you use faster animation players, you still run up against speed limitations. You also have no guarantee that your animation will play at a consistent speed throughout. The real answer is the use of additional hardware to play animations. This way you can overcome system limitations and play even complex animations at 30 fps.

NewTek's **Video Toaster 4000** ($2395) offers full-speed AGA playback, but with some caveats. It plays back only in lo-res, and the entire uncompressed animation must be in memory, so you need lots of RAM for even a very short animation. With the full 18MB on the motherboard, your A4000 can play just 5.5 seconds ►



A 600×400 24-bit test image (top, 371K) is followed by 16-color (93K) and 256-color (196K) versions that show color banding and dithering. Next down, the 169K HAM8 rendition looks almost as good as the original. The three-bitplane DCTV image (bottom, 56K) shows banding and artifacting, though less pronounced in NTSC.

of animation, although you'll get consistent 30 fps playback. This works, but it's a very limited solution.

A better choice is ***IVS's* MovieMaker** ($895), a hardware/software combination that uses DCTV as its display. If you want to play animations at 30 fps, you currently need an A3000. To run it on an A4000 you need a SCSI controller and hard drive instead of the built-in IDE variety. The A2000, because it is primarily a 16-bit rather than a 32-bit machine like the A3000 and A4000, gives you only about 15 fps.

You also need a very fast SCSI controller, and some, such as the popular controllers from GVP, are not compatible with MovieMaker. Finally, you need a very fast and large hard drive, with a partition of 500MB being about minimum for practical purposes.

There are two main advantages to MovieMaker: It has very flexible digital nonlinear editing capabilities, and it provides synchronized 16-bit sound. You load all of the images, animation, and sound onto a partition on your hard drive that MovieMaker has formatted with a proprietary format.

Using the editing software, you can easily organize all of the visual elements into a movie, setting up edit points and sequencing it any way you wish along a timeline. The images on the hard drive are randomly accessed based on your editing decisions, so creating a movie is fast and easy, and making changes is simple. You can mix and match animations of different speeds and types (it can play any images from sequenced stills to ANIMs in DCTV, AGA, or any other Amiga display mode).

MovieMaker comes with a 16-bit audio card for playback and recording. Its editing capabilities are limited to cut, copy, and paste, so a soundtrack with layers is out. Sound is saved in the standard AIFF format.

Adding audio is easy. You select the in and out points from your audio source material and paste them into the movie timeline. The current version does not have multitrack capabilities, though, so you cannot add a music track over a sound-effects track, for instance. (This feature may appear in an update.)

So far, ***DPS's* Personal Animation Recorder** ($1995) provides the best quality and fastest speed. A breakthrough product, PAR is one of the best ways I have seen on any platform for dumping 3-D animation to videotape. It gives you full 24-bit imagery, which is encoded to composite, S-VHS, or full component Betacam or MII for images that look as good as they did on your RGB monitor.

PAR does not have the easy editing or audio capabilities of MovieMaker, but if you need full 24-bit color hi-res overscan animations, it is the only option besides single-framing. It uses a dedicated hard drive (currently Seagate's 3600A 540MB drive, which can hold about five minutes of animation, is the only one officially supported) and a custom compression scheme to let you copy frames to the drive. You can also render them directly from your 3-D software.

Frames are automatically compiled into an animation that you can play instantaneously at full speed. You can also synchronize music and sound effects with SMPTE time code using ***SunRize's* AD1012** ($595) or **AD516** ($1495) 12- and 16-bit audio boards. You can even use ARexx to trigger playback or control anything in the user interface.

Once you have created an animation, you can use the split and join functions to quickly combine individual animations, replace a bad frame, and so on. Such edits affect the physical contents of the drive, however, which is not the case with MovieMaker. With the help of ***DPS's* Personal TBC IV** time-base corrector ($999), you can also capture live video and play it back or mix it with animation sequences. Rotoscoping is also possible; the compressed frames can be transferred to your regular hard drive as IFF24 images.

Other alternatives to single-framing are on the horizon. Both Commodore and Digital Micronics (DMI) have announced MPEG (Moving Pictures Experts' Group) decompression boards, and DMI has yet to ship its JPEG (Joint Photographic Experts' Group) playback board. IVS is also planning a JPEG playback card that will use the same interface as MovieMaker, but provide greater quality and flexibility. Overall, we can safely say that the days of single-framing are numbered. ■

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The Singular Solution

As good as DPS's Personal Animation Recorder is, its image will degrade after more than three generations (that is, after it's been copied three times). For extensive generational editing, single-frame recording is still the best solution.

For traditional single-framing you need a frame-accurate recorder, such as Panasonic's AG-7750 ($6800) and special controller hardware and software for connecting it with the Amiga. A number of such controllers are available, including ***BCD Associates'* BCD-2000A** card ($995), ***Diaquest's DQ-Taco*** ($2195), and *Nucleus Electronics'* line of **Personal Single Frame Controllers** (from $445). The software lets you list images to be recorded and the time-code position at which the recording should start. Your 3-D program can generate frames for recording directly, or you can record previously rendered frames. Once you've made your list, press the Start button and prepare to wait.

The premier single-frame solution, however, is the use of a recordable optical laser disc. Optical-media recording is fast: You don't have to wait for tape prerolls or any other mechanical delays. ***Media Innovations'* new FramePro** ($495) supports all of the ***Panasonic* Optical Memory Disc Recorders**, including the **LQ-4000** (from around $11,000). Creating a list of frames in FramePro is as easy as dragging a drawer of images onto the software's window. You can then edit the list any way you want, and create preview animations in 1/4 scale or full scale in HAM8, HAM6, or in 32-level gray. It can control ASDG's Art Department Pro 2.0 to batch-process the gamma and scaling factors of each image, and display the images through Centaur's OpalVision display board, Impulse's Firecracker, Mimetics' Framebuffer, GVP's IV24, NewTek's Toaster, or any of the Workbench 3.0 display modes—or send them directly to DPS's Personal Animation Recorder. The software lets you create animations from images in multiple directories, and gives you complete control over the Panasonic recorder, including the ability to play a range of frames from the disc, something you can't normally do.

—GW

Squeeze Frames

If you're looking for decent, realistic playback without spending a lot on fancy equipment, take some free advice on designing, rendering, and viewing animations the economical way.



If this scene looks familiar, then you're probably aware that the author of this article is a pretty accomplished animator of some highly acclaimed Amiga works, such as this interior from "The Elf Works Museum."

WE'RE SAVING THE least for last, so to speak. While that may sound odd, at first, when it comes to the trio of animation features presented in this issue of *AW*, this third and final one will definitely involve the smallest outlay of cash. Why? Because we're going to examine some economical tips and techniques to help you get quite decent animation from pretty much any Amiga without using expensive equipment.

The previous article showed you how to bypass the time-consuming, tedious process of single-framing and still achieve high-quality animation playback. Here, we'll look at some practical techniques and low-cost tools, both commercial and shareware, that allow you to create quite impressive full-screen animations and play them back right on your computer monitor—without the need for either a single-frame video recorder *or* any other external device.

But, First, A Few Words to the Wise

There are, however, limitations to the stock Amiga display modes that have to be overcome. Fortunately, once you become aware of these limitations, it is fairly easy to design your original scene in ways that reduce the problems. You merely have to follow these few simple guidelines: use the right tools; design within the limits of your machine; and, finally, be flexible.

Another important thing to remember is that all animations are made from a series of still images. A single second of animation can use up to 30 of these stills, and each of the images can be anywhere from 50K to 1MB in size. The finished animation can be virtually any size, from 2MB to 200MB, depending on how many frames there are—and how much free disk space you have. Obviously, it's going to take a lot of memory, storage space, and processing power to deal with all this information. If your system is already well endowed, you should be in good shape. If not, there are a few things you'll need to consider.

First, when it comes to RAM, buy as much of it as you can afford—or, better still, as much as your system can hold! As you will quickly find out, 3-D programs themselves require lots of RAM. To efficiently process the 24-bit images produced by most 3-D programs, you will need at least 4MB of RAM, though much more is recommended. Most importantly, animation programs can play back only from RAM, and when you *can* play the animations back from disk, there are usually noticeable pauses during the animation.

Second, if you're going to produce animations of even moderate length or complexity, you must have a hard disk. Your finished animation—even when compressed (see below)—can be anywhere from 1MB to more than 20MB in size.

Finally, if you don't have a newer Amiga with a more high-powered processor, you will need an accelerator. ►

By Erik Flom

Basic 68000 systems will be hard pressed to give you an acceptable level of animation quality. If you have a stock, unaccelerated Amiga 1000, 2000, or 500, you'll find it very difficult to acieve satisfactory results, even using the techniques described here.

Okay, you've equipped your system with the resources you can afford. Even if it isn't ready to win the Power Users' Derby, fortunately, there are some simple ways to deal with the large size of animation files and to minimize the amount of data required to create nice, smooth animations.

Delta Force to the Rescue

The key to economical animation on the Amiga is found in the ANIM file format. An ANIM file contains all the frames of an animation in a compressed format. The ANIM format reduces the amount of data needed to store an animation by saving only the difference, or "delta," between successive frames of the animation. With this technique, called *delta compression*, only those pixels in an image that have changed are saved. During playback, each frame of the animation is built from the previous frame plus any changes. Since only the difference between two images is stored, the resulting ANIM file is considerably smaller than a file where all the information for each frame is saved. Of course, this type of compression works best when most of the image is not moving, but not so well when there is a lot of motion between each frame.

The ANIM format has been revised a number of times, but the most common incarnation is the ANIM-5 format. Two new contenders, ANIM-7 and ANIM-8, are variations of the older ANIM-5 format that result in slightly bigger files, but ones which play back *much* faster on accelerated machines. (While it would stand to reason that ANIM-8 should be the better of the two, popular opinion seems to indicate ANIM-7 provides the faster playback.) The only program I know that currently supports the ANIM-7 format is a shareware picture viewer called Viewtek (which we will take a closer look at later on in this piece).

These recent improvements in the ANIM format are very significant—allowing you to achieve real-time animation playback that is more than adequate for most preview, pre-production, and home use. Using the new ANIM-7 format, even conventional HAM-mode animations will appear smooth and fluid. Combine ANIM-7 with the new AGA HAM8 mode on the A1200, and you may have the best video animation platform in its price range. HAM8's 24-bit palette and greater color resolution can yield low-resolution, noninterlaced animations with little or no discernible posterization. When viewed on your monitor, or from videotape, the quality of such animations can be quite astounding. If your Amiga has a composite-video output, or other genlock device, you can easily record these animations for use in your own home videos or as samples to be shown to prospective clients.

Minimalist Design

Even with the benefits of delta compression, there is a limit as to how well the Amiga's custom graphics chip set can display video. The fastest Amiga 4000 cannot display high-resolution interlaced animations at 30 frames per second (fps). Older, 16-bit graphics machines will suffer far more severe penalties in speed. For this reason, certain trade-offs have to be made for the sake of playback speed and file size. You must design your animation within the limits of the Amiga it is to be shown on.

The best way to improve the playback speed of an animation, and make the final animation files smaller at the same time, is to reduce the amount of information that changes between frames. There are several rules of thumb to follow here:

1. Avoid dithering.
2. Keep the background stationary and camera moves and complex action to a minimum.
3. Reduce the frame rate.
4. Use low display resolutions and antialias individual frames.

Let's look at these techniques in greater detail.

1. Avoid Dithering

Dithering, which can be used to smooth gradients and add additional apparent colors, can sometimes be a problem as a gradient is made up of many different colored pixels. When you move an object with just a few colors that fill a solid area, fewer pixels change color as that object moves. With dithering, a lot of pixels change, even if the object moves by just a single pixel in any direction.

2. Background Stationary/Action Minimal

You should design your scenes to minimize the amount that the background moves. If your 3-D animation has the camera closely tracking a speeding fighter ship as it winds its way through a series of twisty canyons, you can expect your animation file to be incredibly huge, and you'll be lucky to get it to play back at even 15 fps. On the other hand, if you have the camera locked into position and the fighter tears past the screen over a still background, the resulting ANIM file will be a tolerable size and you can expect a decent playback rate. (True, the shot is nowhere near as exciting, but it will play back much better.) A good rule here is to keep the amount of change to less than one-quarter of the screen between frames. If your scene does require the entire screen to change (as in panning across a scenic vista or zooming in on an object), try to keep the motion path as slow as possible; if the amount of change between frames is low enough, there won't be any appreciable hesitation in the animation.

3. Reduce Frame Rate

Reducing the frame rate of your animation can yield significant savings while still allowing for fairly good, realistic motion. As an example, movie film is shown at 24 fps (not 30 fps), while the European TV standard uses 25 fps. It is possible to reduce your own animation to as low as 20 fps—or even 15 fps—before it begins to look choppy. (At less than 15 fps it is very hard to get an accurate feel for the motion paths of the animation.) If you design your animation to play back at, say, 20 fps, you reap the dual benefits of producing a smaller file (meaning you can get longer playback ►

times) and having less data to update (allowing you to move the camera and have higher deltas between frames before the animation starts to slow down). While I still recommend that your playback rate be as fast as possible, there are some scenes that simply will not play back at full speed because of the large deltas between frames—and these are the ones where it is best to render the animation at a lower frame rate

4. Lo-Res Display/Antialias

The best way to create a good-looking animation with a high frame rate is to use a low display resolution and then antialias the individual frames. You might think a higher-resolution animation would look better, but that is not the case for several reasons: First, hi- res can easily double or quadruple the amount of data required to display each frame. If your computer has to push around more data, then the animation will hesitate and slow down when there is a lot of motion on the screen. Also, at higher display resolutions, the custom graphics chips have to access chip RAM more frequently—limiting the time the CPU has to update the next frame and causing the animation to slow down even more.

The second point about hi-res animations is that the increased pixel resolution will rarely make the animation look any better. With non-AGA Amigas, it simply is not possible to have more than 16 colors or shades of gray—which just isn't enough color resolution for most animations. It's better to sacrifice some clarity to get a much wider range of colors. For example, a standard VHS VCR can display an image that is only about 230×480 pixels in resolution. The reason VHS playback looks as good as it does is that the "pixels" in video are antialiased and the image is updated 30 times per second. I doubt people would buy VHS players if the picture was four times sharper, but only ran at 15 fps! A smooth-playing, low-resolution HAM ANIM will look much better than a higher-resolution ANIM that stutters and looks posterized.

The key, then, to creating good-looking lo-res animations is to antialias the pixels. Antialiasing is a feature common to most 3-D packages, and it works by averaging a number of pixels into one. By calculating extra pixels (as if it were a higher-resolution image) for lines and sharp color transitions, the annoying "jaggies" common to lo-res images are reduced. If your 3-D software does not offer antialiasing, you can use the scaling features in such animation programs as Rend24 (shareware), ImageFX (GVP), or Imagemaster (Black Belt) to do basically the same thing.

By employing a combination of the above techniques, it is possible to create an animation that looks good and plays back at a decent speed without any jittering or hesitation. Just remember that for most purposes, you'll get best results using a low-resolution, noninterlaced, nondithered, HAM display mode for animation.

Enter The Dynamic Duo

To finish off our collection of tips and techniques for economical animation creation and playback, let's take a hands-on look at two shareware programs mentioned earlier in the article: Rend24 (version 1.05a) and Viewtek (version 1.05 or later). Both can be found on the commercial networks, on many Amiga-specific Amiga BBSs, or in the Fred Fish collection. The combination of a powerful Amiga ANIM creator like Rend24, along with a wide-range picture viewer like Viewtek, can make pretty much any Amiga into an animation powerhouse. (On CompuServe, these are available in the Amiga Arts forum under the filenames RND15A.LHA and VT105.LHA, respectively. On GEnie, they are File #18420, REND24_105.LHA, and File #20688, VIEWTEK105.LHA.)

Rend24 may be the best piece of graphics shareware released for the Amiga. While it has many uses, its primary function is that while you are rendering, it will run in the background and create animations on the fly—greatly reducing the amount of storage space needed to produce an animation. Viewtek is probably the best all-around picture/animation viewer currently available for the Amiga. Its features are many, including automatic support for JPEG, GIF, and IFF picture formats, auto-detection of AGA modes, drag-'n'-drop icons, support for Datatypes in Workbench 3.0, playback of ANIMs from hard disk, and more. (By the way, to take advantage of the AppIcon and the drag-'n'-drop features of Viewtek, make sure the ICONIFY ToolType is active and drop the VT icon in your WBStartup drawer.)

To begin the rendering process, set up your rendering package to render out individual frames to disk (or to a RAM disk, if you have enough RAM, for even faster rendering). If your program supports antialiasing, set it to render at its lo-res setting (up to 376×240 pixels); if not, render at medium resolution (up to 752×480 pixels) and let Rend24 do the antialiasing.

Now that you're set to render some images, fire up Rend24. Once you familiarize yourself with it, Rend24 has a very nice little front-end offering many features. There are a group of text fields at the top that allow you to choose the source image(s), to set the range of frames (for an animation), and to select the name of the final image or animation. (Note: Make sure to press the Return key after entering text in any of these fields. If you don't, any changes you've made will not be recorded.)

A group of six cycle gadgets in the middle of the window allows you to specify the display mode in which the finished image will be rendered. For most purposes, leave Device set to "Amiga" and Monitor set to "Default." (Note: If you have a DCTV or HAM-E display device, you can render out to those formats directly from Rend24 by choosing the appropriate Device setting.) Set Format to "HAM" (or "HAM8" for AGA owners.) While you could set the Horizontal and Vertical gadgets to "Lo-res" and "No Lace," respectively, it's easier to simply check the "Auto Mode" button—this will set the display resolution to the best size for your animation.

The Auto Mode button is the checkbox in the upper-left position in the panel of checkboxes found in the lower half of the window. These boxes allow you to set options like dithering and scaling to be applied during the conversion process. Only a few of these buttons are important for most applications. The "Halve Width" and "Halve Height" buttons should be checked if the 3-D package is rendering at any size greater than 376×240—this will scale the image to fit a lo-res, noninterlaced screen, and antialias it at the same time. (If you don't scale the image, be forewarned: Rend24 will gladly render an animation out at full resolution, even if you can't see it all on the screen at once.) ►

Finally, in the column of checkboxes to the right, check all but "Ping-Pong Anim." "Delete Source's" will delete the files rendered by your 3-D package after it's been converted to an Amiga display mode and saved as part of an ANIM file (which is especially important if you are saving the images to a RAM disk). If you don't check "Hide Conversion," the Amiga version of each frame will be rendered as the front screen, which can be distracting if you are using your Amiga for something else at the time. "Don't Pause" means Rend24 will not ask for any user input as each picture is processed. "Wait for Source's" tells Rend24 to wait until an image shows up (if it's not there already), thus allowing it to sit in the background and process the images as they are created. Finally, "No Loop Frames" prevents Rend24 from saving an extra set of frames at the end of the animation—programs like Viewtek prefer ANIMs without loop frames, while DPaint expects them.

Now that you have both the 3-D program and Rend24 ready, it's time to see if everything works. Click on the "Begin Conversion" button in the lower part of the Rend24 window. The main window should disappear, and a small status window should appear in the middle of your Workbench screen. Now, go to your 3-D program and begin rendering. As each frame is finished, the status window should indicate that Rend24 is processing each image as it appears. If it doesn't within a few minutes of the frame being saved, double check the source filename and make sure you've selected the correct range of frames to process. Once you have begun compiling your animation, you can go off and leave the machine unattended—it will happily render away, processing images as they show up. Depending upon the length and complexity of your animation, it could be done in anywhere from hours to days.

Once the ANIM file is finished, use Viewtek to play back your animation. If the animation still looks too slow, or has spots where it hesitates on playback, you should convert the file into ANIM-7 format using the MakeANIM7 utility supplied with Viewtek. (Information on conversion should be included with the archive.) Note that Viewtek provides a fair number of options; most, however, are accessible only from the CLI. To take full advantage of Viewtek, make sure to read the documentation.

In closing, I cannot stress too heavily the importance of experimentation. The key to success is to try out a few frames first in various modes and see which look best. While HAM or HAM8 will give you the best results in most situations, there is no hard-and-fast rule. It all depends on the subject matter—and how willing you are to be flexible and to push the creative envelope! ■

Erik Flom is the owner of ELF Works Construction Co., a full-service 3-D production facility. Having worked in television, theater, and the computer games industry, Erik has finally found his calling as a 3-D animator. He's been producing 3-D graphics on the Amiga for more than six years.

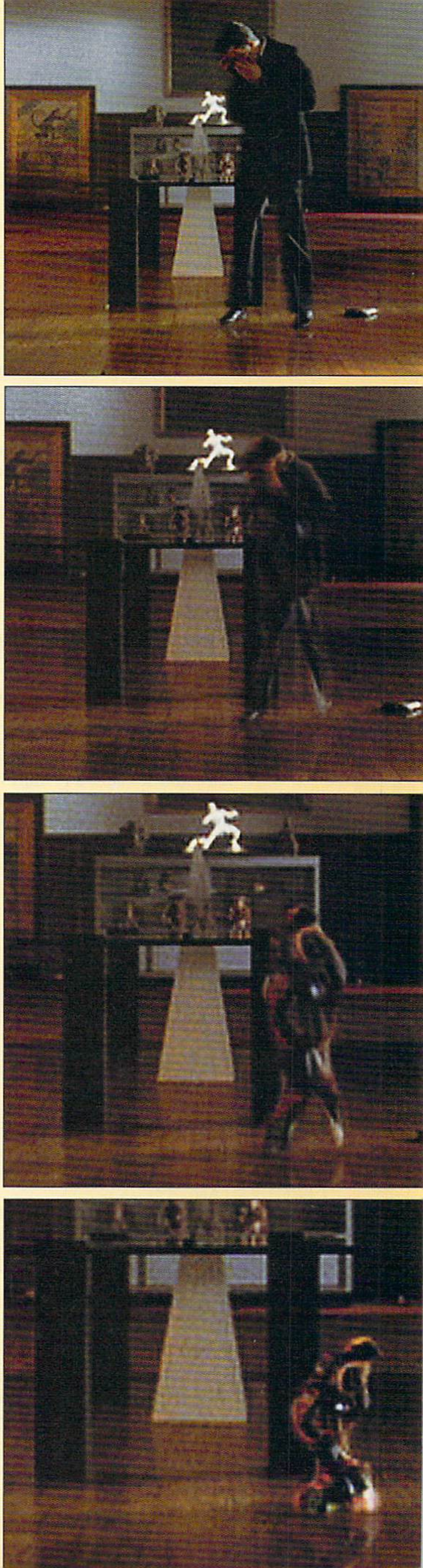
Amiga Goes Hollywood

Step aside, Mel, Arnold, Whoopi, and others. The hottest young star on the entertainment circuit these days is the Amiga, which has landed leading roles in some of the biggest productions Hollywood has ever produced.

WHEN THE FOX network introduced *Babylon 5* (see *AW* Sept. '92, p.8)—which employed the Amiga computer to create the special effects for its two-hour TV premiere last winter—there were skeptics in Hollywood who believed that the show and its Amiga-generated imagery would not succeed. Since its debut, *Babylon 5* has been picked up for 22 more episodes, and Hollywood has accepted the Amiga—for years typecast as a low-end graphics machine and character generator—as a cost-effective solution for their complex graphics needs.

This year, Amigas are being used to generate special effects for broadcast television and feature films; they have become ►

By Janice Crotty



Warlock—Morph sequence

an essential part of pre-production planning; and they are generating the artwork for use on the set. With big-name projects like *SeaQuest*, *Jurassic Park*, and *Young Indiana Jones Chronicles* on its list of credits, the Amiga has definitely arrived upon the Hollywood scene.

PRIME TIME AMIGA

The Amiga's first stop is prime time, where Amblin Entertainment is using the machine to unleash some of the positive potential of network television with its new NBC TV series, *SeaQuest*. The Amiga plays a crucial role in creating some of the spectacular effects that make this show "special."

To handle the project, Universal Studios set up a dedicated Amiga-based computer-graphics facility called Amblin Imaging, with the idea that—once *SeaQuest* is on the air and the facility is settled in—it would take on other Amblin and Universal projects, including feature films and television shows.

According to manager/coordinator Taylor Kurosaki, Amblin Imaging is "trying to bring back a little of the magic of network television and family television. People should be able to sit down and watch something that's visually exciting and entertaining, and not have to go to their Blockbuster store to do it or turn on HBO."

To that end, Amblin Entertainment and Universal Studios spared no expense. For the pilot they cast Roy Scheider in the leading role, hired director Irvin Kirschner (who has successes like *The Empire Strikes Back* and *Robocop 2* behind him), and planned more than 75 special-effects shots (which is particularly impressive, considering that *The Empire Strikes Back* had only 60 such shots).

So how can they pull off such a feat on a weekly program? In two ways: First, they have a big budget, approximately $1.5 million per episode. Kurosaki guesses that it will be the most expensive television series ever produced.

Second, and equally important, all of their special-effects shots, as well as their on-set graphics, are being created on the Amiga with NewTek's Oscar-winning (see July '93, p. 12) Video Toaster and its 3-D animation software, LightWave.

The show takes place on a 1000-foot submarine, and promises to be a combination of *Star Trek* and *The Hunt for Red October*. All exterior views of the sub, as well as shots of various communities, machines, smaller vessels, and so on, are created with LightWave (one appears on this month's cover). No miniature models are used. And as the show's production schedule moves from pilot to weekly series, Amblin Imaging will have to produce five to ten new effects shots for each one-hour episode—a tremendous pace.

Amblin Imaging employs eight animators and more than 60 Amiga computers, which are connected in a "rendering farm," a network that distributes the rendering work among a number of computers. Amblin Imaging is easily the largest Toaster facility in existence, and it serves as the unofficial testing ground for the latest upgrades to the Toaster software.

"We have an entire facility here... built for less money than an SGI house like Digital Domain or ILM could do the pilot episode for," boasts Kurosaki.

"We are reshaping how people view medium-budget features and television series, in terms of the effects they can do. A show like this would never have come into existence if it wasn't for the Amiga."

Another TV show that owes part of its success to the Amiga is the popular cable show, *Quantum Leap*. A year ago, the special-effects supervisor of *Quantum Leap* approached The Post Group, Hollywood's renowned post-production house, asking if there was ►

Amiga's Show Biz Credits

The Amiga and its entourage of fine software is really no newcomer to movies and television. And its application is far from limited. Years ago, for instance, Rick Probst used the Amiga to do titling for the film comedy *Three Men and a Baby*. More recently, Thomas Hollier and Anti-Gravity Workshop used it to produce graphics for the film *Honey, I Blew Up the Kid*.

Maybe you've seen Amiga effects in television movies such as Stephen King's *The Dark Half*, for which Everett Burrell did character alterations, and *Tommyknockers*, for which The Post Group did monster morphing with MorphPlus. Or possibly in the HBO movie *Afterburn*, which featured realistic in-flight shots by LA-based studio Toaster Marmalade.

Headed by Mark Stross, Toaster Marmalade is also producing its second season of the popular Sci-Fi channel series, *Mysteries from Beyond the Other Dominion*. And it's no secret that Toaster-equipped Amigas helped Joe Conti and crew to produce effects for *Unsolved Mysteries*.

Disney animator Kelly Day has used Imagine, Sculpt, and Pro Draw to create graphics for the animated series *Goof Troop*. This season, Warner Bros. debuts an animated series, *Animaniacs*, which is created using GVP's ImageFX.

The folks at Nickelodeon know Amigas well. Way back when, Dean Friedman introduced Mandala-equipped Amigas to the show *Total Panic*; now, such systems provide the interactive element so essential to *Nick Arcade*. Derek Grime has used it on the production of Nickelodeon's sitcom *Clarissa Explains It All*.

If you watch MTV, you've seen countless transitions, titles, and animations by such Amiga artists as Rick Finn. You've also seen Amiga effects in the music videos themselves.

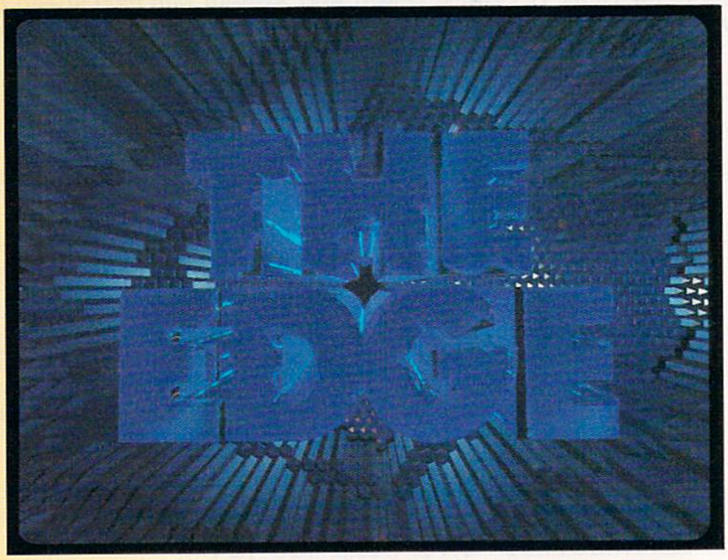
PBS specials, commercials... you name it and the Amiga's been there. Furthermore, scores of cable operators nationwide have discovered Amigas and depend on them to keep their stations running 'round the clock. ***—BG***



Jurassic Park—**"We just wanted to know how big the rex was, and how he was going to fit onto the set."**



Young Indy—**"I discovered that there were fewer and fewer qualified sign writers available who could handle the kind of quality, the kind of period feel, that I needed."**



The Edge—**"I constantly see people doing outrageous stuff on the Amiga...animations that nobody would even attempt on an SGI."**

a way to use morphs in the show without breaking the weekly budget. Peter Moyer, VP of editorial at the Post Group, contacted ASDG, which was at the time developing its MorphPlus product. Because Toaster output quality is not sufficient to satisfy the rigors of Hollywood broadcasters, ASDG created software drivers that enabled The Post Group to output rendered frames (in a resolution surpassing even D1) straight to an Exabyte tape. This software, in Moyer's words, lets The Post Group "go out into the real world."

With the software and hardware tools in place to perform low-cost, high-quality morphs, a pair of characters, the evil leapers—time travelers who can change themselves into other people—were written into *Quantum Leap*. They appeared in four episodes, morphing from old to young, and male to female.

Amiga Sorcery

The Post Group's latest Amiga project takes their work on *Quantum Leap* one step further—by incorporating full-speed dynamically changing morphs, where the person or object being morphed actually moves while the metamorphosis is happening. In *Warlock*, a Trimark film that opened in September, The Post Group turns an evil art dealer into a sculpture. While not as dramatic as turning a man into a woman, the animation was technically demanding, incorporating a highly reflective floor, shadows, and movement. The shadows of the moving person and the shadows on the floor had to match precisely.

In another morph that The Post Group created for the film, the warlock character grows impatient with a stubborn receptionist and wipes away her mouth. Essentially, The Post Group morphed from an actress in street-style makeup to the same actress with a prosthesis covering her mouth.

Moyer likes having the Amiga capabilities in his company's special-effects stable. "You don't have to throw your big gun out all the time," he says. "There are times you can do it with a six-shooter. Our clients are always looking for cheaper ways to do it, and the Amiga provides us with more options."

A Dino-Mite Solution

Last summer Steven Spielberg's 65,000-year-old T. rex stomped across America, thrilling audiences and studio execs alike. But getting the T. rex scenes right was something of a challenge: It was difficult to conceptualize that massive dinosaur, and to keep it in proportion to the cars, kids, fences, and commodes during that memorable road scene. Such a tricky business required an unconventional approach. Enter the Amiga.

Typically, a film's art director will draw storyboards of the camera shots that will make up a sequence. In this case, that wasn't going to be enough. One of the art directors from Amblin Imaging introduced the *Jurassic Park* staff to the Video Toaster, which proved to be a key in putting together the T. rex sequence.

Stefan Dechant had never used an Amiga or a Toaster before, but he was an experienced designer hired to create storyboards for the Tyrannosaurus rex road sequence.

"I don't even think originally we were thinking animation," says Dechant, a veteran of such prestigious effects houses as Industrial Light and Magic (ILM). "We just wanted to know how big the rex was, and how he was going to fit onto the set." ►

Eventually, the *Jurassic Park* team established a pattern: Spielberg would discuss the scenes with the art director, and then together they would lay out how the sequence would happen. A staff of illustrators would draw the rough sequences and storyboards, and then Stefan would animate them in LightWave on one of his two Amiga 2000s, one of which has an '040 accelerator.

To conserve rendering time, animations were deliberately quite rough. His storyboard animations were cut together with other, more traditional storyboarding methods to work out timing and other logistical issues. Of the 15 or so shots he animated, Dechant estimates that ten made it into the film.

Sign of the Times

A different example of how the Amiga is used in Hollywood can be found on the set of *Young Indiana Jones Chronicles*, which reflects the creative talents of Jeff Ginn. As a production director, and more recently an art director for film and television, Ginn—who began his career in film more than 14 years ago—is responsible for re-creating the period and locale for the project, from the cars driving down the street to the trash on the curb and the signs in the store windows.

He begins such a project by using elements from the script and materials provided by the studio's research libraries to create a visual concept for the scenes. "Then it's my job," Ginn describes, "to actually place that vision in front of the camera, whether that be through construction, painting, set decorations, signage, graphics, the whole gamut." For Ginn, who used to employ professional sign painters to create what he needed, the Amiga is an essential tool for producing period graphics and signs.

"As I began traveling more and more," says Ginn, "I discovered that there were fewer and fewer qualified sign writers available who could handle the kind of quality, the kind of period feel, that I needed." A computer would be an expense savings, and he could take it with him on location.

Equipped with two Amiga 2000s, Ginn creates his own period fonts, either scanning them from old sign writers' fonts or drawing them himself using Professional Draw. The completed files are output to a plotter that is equipped with razors instead of pens; these cut through the vinyl that makes up the physical signs. Once assembled, the signs are artificially aged to produce the right look.

Using this Amiga setup, Ginn recently headed up production for the American episodes of ABC's series *Young Indiana Jones Chronicles*. Ginn and art assistant Gordon Barnes had two months to prepare for the series, and then the episodes were filmed back-to-back, with only 14 days of filming per episode. Together, they created all of the signage and period graphics that appeared on the sets.

"We were going at such a hectic pace," Ginn recalls. "It took us a while to get the color schemes down. Color graphics—period show cards, posters, store signs, glass signs, and all—were very decorative in 1915 and 1920. It was Art Nouveau. I have a huge library of reference books that we used for color."

By using the Amiga, Ginn and Barnes were able to quickly produce period-accurate graphics for such historical locales as Al Capone's Chicago of 1920.

Currently, Ginn and Barnes are creating graphics for a horror movie, *Mouth of Madness*, with director John Carpenter (of *Halloween* and *Starman* fame). This time, though, instead of creating period signs, they are creating faux book covers, movie posters, and other stage-setting graphics.

A 3-D Commercial Success

The big Hollywood money isn't only with film and TV series. All you have to do is watch the World Series to know that commercials bring in big stars and high production values. Here, too, the Amiga has redefined the playing field.

Digital Fantasy, a Southern California graphics house that specializes in high-end 3-D animations, has added an SGI workstation, a Macintosh Quadra, and eight Amigas (a mix of A3000s, A3000Ts, and A4000s) to its operation. The addition of these machines has opened up opportunities for the group to expand what it does into a wider range of projects. According to Digital Fantasy president Damian Klaus, the Amiga has two assets: First, it's a versatile platform with a good price point; second, it comes with a less tangible asset—Amiga users. "I constantly see people doing outrageous stuff on the Amiga. I've seen some animations that nobody would even attempt on an SGI." As the founder of Wavefront, respected developer of 3-D software on the SGI platform, he's in a position to know.

Tim Molinder is one of those outrageous Amiga users. A filmmaker who bought an Amiga for home use, he's now senior animator at Digital Fantasy, and has just finished a wild television commercial for a water slide called The Edge in a Southern California amusement park.

Using Amiga computers, Impulse's Imagine software, and some of that zany creativity, Molinder and the animators at Digital Fantasy put together a 30-second animation that captures the thrill of the ride.

"Tim tortures these machines," says Klaus. "His average scenario is to have two, and sometimes as many as five Imagines open at once, and he switches back and forth between them." In the spot for The Edge, for example, Molinder needed to create a complex texture. Rather than make a texture in Photoshop on the Macintosh, he created a field of hexagonal crystals—literally hundreds of them. "It's easily the most polygons anyone's put into an Imagine scene," claims Molinder. He admits that by the end it took ten minutes to cut and paste groups of the crystals, but he got the results he wanted. "Having the actual real 3-D highlights," he maintains, "gave the end piece a dimension that I don't think we could have gotten any other way."

"It would have cost up to five times as much on an SGI," continues Molinder, "and I don't think we would have gotten any better results. I've found that Imagine and the Amiga allow you to bring a whole range of tools, simply because it's less expensive."

"I don't find the Amiga a limit to what I can do," says Molinder. "I find the budget much more constraining." And the Amiga makes a big difference there. ■

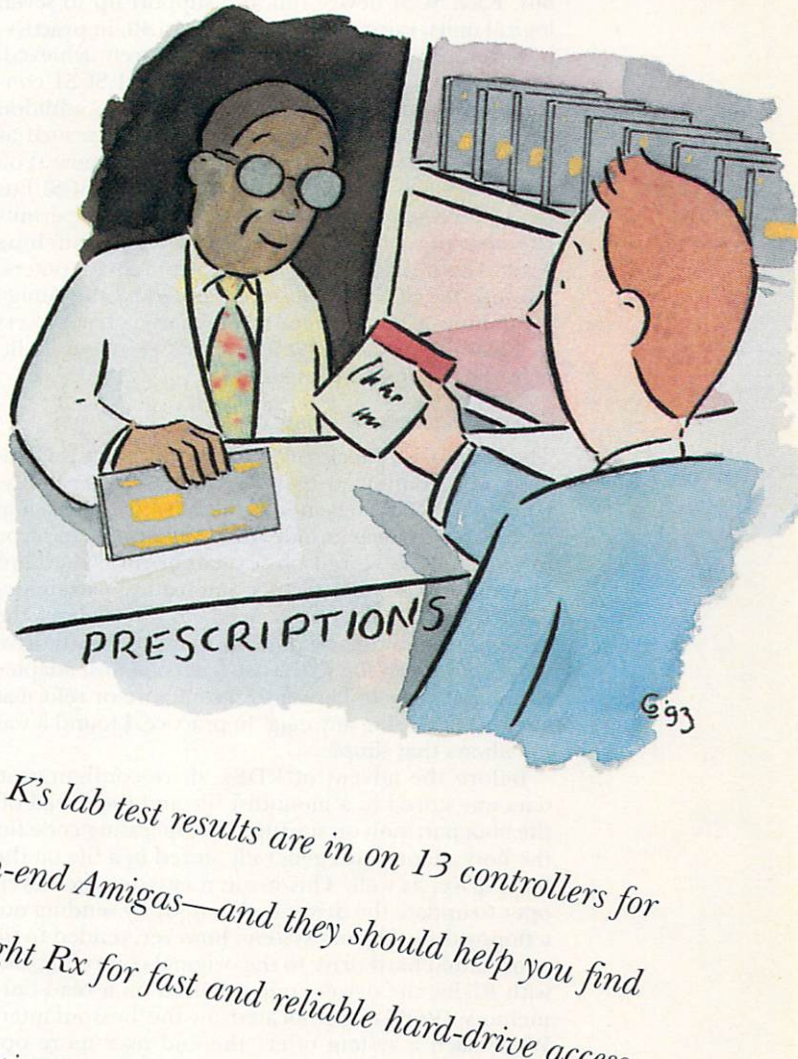
Janice Crotty lives in San Francisco and is the Assistant Managing Editor of GamePro magazine. Her inside view of the computer entertainment market helps her keep her finger on the pulse of the Hollywood Amiga scene.

The Spin Doctors

Amiga Hard-Drive Controllers

PART 1*

**Editor's Note: This first installment of a two-part series covers controllers for the Amiga 2000, 3000, and 4000. Next month, in Part 2, we'll tackle the Amiga 500, 1200, and CDTV.*



Dr. K's lab test results are in on 13 controllers for high-end Amigas—and they should help you find the right Rx for fast and reliable hard-drive access.

TRYING TO RUN your Amiga with only floppy drives is like hauling a trailer with a team of Clydesdales—you'll get the job done but it will take some time. Furthermore, the increased size and sophistication of many of today's Amiga programs require you to use a hard drive in order for them to function. The basic Amiga 2000, which is now rather scarce, is equipped with a single floppy drive and plenty of expansion space. The Amiga 4000 series is supplied with an IDE hard drive, but you may be interested in increasing your storage capacity or adding a faster SCSI host adapter.

A Word About Drives

The current crop of hard drives are bigger, faster, and cheaper than ever. Although the total price of large-capacity drives is not inconsiderable, the best performance and lowest per-unit costs can be found with gigabyte-capacity hard drives that sell for about $1 per megabyte. (A gigabyte is 1000 megabytes.) For a more moderate initial investment, hard drives with 100+MB capacities can be had for about $250. For a little more than $300, you can bump your storage space into the 200+MB range.

At present, hard drives are available in two flavors. The IDE (Intelligent Device Electronics) variety has become firmly entrenched in the PC world.

The advantages of IDE drives are a large selection, ready availability, and sometimes a slightly lower price. The disadvantages are slower data transfer speeds and limited expansion options. The IDE bus is limited to two devices only, and only hard drives (as opposed to other mass-storage solutions and other kinds of expansion devices) are available. Cable length, ►

By Morton A. Kevelson

which should be less than two feet, can also be limiting. The increased popularity of IDE drives, however, has prompted most Amiga developers to provide support for these devices. In an effort to cut costs to the bone, Commodore has made the IDE interface the default system for the Amiga 4000.

Despite a late start, the SCSI (Small Computer System Interface) standard is now quickly increasing in popularity in the PC environment. As a result, the price differential between SCSI and IDE hard drives has all but disappeared. SCSI systems offer better performance and greater expansion options. Up to seven SCSI devices can be daisy-chained on the SCSI bus. Each SCSI device can also support up to seven logical units, raising the total count to 49; in practice, however, this degree of expansion is rarely achieved. Most SCSI hard drives have imbedded SCSI controllers that are limited to a single unit. In addition to hard drives, SCSI supports other devices such as CD-ROM drives, tape drives, scanners, and more. You can also network SCSI systems so that the SCSI bus can be accessed by two or more systems. This permits the sharing of expensive peripherals, such as read/write optical drives, among several computers. Because the SCSI system was adopted by the Amiga community at the very start, Amiga users have access to a mature technology offering numerous, easily integrated expansion possibilities.

"Conventional" Wisdom

The Rigid-Disk Block, or RDB, specification is Commodore's solution to hard-drive interchangeability. Under the RDB convention, the hard drive's format specification, which includes the number, size and type of partitions, is stored on a small area on the hard drive itself. The host adapter automatically examines the RDB to find out all it needs to know about the drive. It should thus be possible to move a hard drive that conforms to the RDB spec from one host adapter to another without having to reconfigure or reformat and without losing any data. In practice, I found it was not always that simple.

Before the advent of RDBs, drive-configuration data was stored in a mountlist file and then read off the boot partition on startup. The operating code for the host adapter was generally stored in a file on the hard drive, as well. This made it easy for the developer to update the driver code simply by sending out a floppy disk. The old system, however, tended to tie a formatted hard drive to the original controller. But with RDBs, the driver code is stored on a read-only memory (ROM) chip located on the host adapter. While such a system offers the end user more options, it can also make code revisions more difficult and more expensive.

In examining the controllers covered in this article, it became apparent that there is additional room for standardization among developers of SCSI host adapters for the Amiga. All of the developers provided easy-to-use installation and set-up programs with their systems—including both fully automatic and manual installation options. Although customized installation software with plenty of advanced options is always of some value, there is now a common denominator that is part of the Amiga's operating system that developers should take full advantage of. The HDToolBox program that comes with AmigaDOS 2.0 and higher is more than adequate for setting up both SCSI and IDE peripherals. Only two developers, however, make full use of this program: Commodore and Advanced Systems & Software International Group. If all developers ensured that their device drivers were compatible with HDToolBox, the chances for across-the-board compatibility with devices such as removable-media drives would be greatly improved.

There is also room for improvement in standardizing hardware connections between peripherals. Because this involves development on other computer platforms, however, it is unlikely that the Amiga community alone can effect such improvements. The standard SCSI connector is a 50-pin double-row header mated to flat ribbon cable. The 50-conductor flat ribbon system can be used for distances up to 15 meters or 50 feet. When Apple adopted the SCSI system for the Macintosh, it also developed a modified cabling system based around 25-pin "D" connectors. The 25-conductor round cables are more rugged for external connections, but they are limited to a cable length of about two meters. Other developers adopted a 50-conductor cable terminated with 50-pin Centronics-type connectors for external cables. (I have also come across a 40-conductor flat ribbon variant, on the Chinon CD-ROM drive, for internal SCSI connections.)

The multiplicity of connector types doesn't stop there either. The most recent variation is a high-density, 50-pin miniature "D" connector that is even smaller than common 25-pin "D" connectors. The Commodore A4091 controller for the A4000 sports a high-density connector on its rear mounting bracket. Last, but not least, the new SCSI-2 specification calls for a wide SCSI bus that adds 16 more conductors to the original 50 for full 16-bit data transfers. As of this writing, no Amiga developers support the wide SCSI bus.

For the interconnection of IDE drives, things are a bit less complex. The 40-pin flat ribbon cable is the standard for 3.5-inch drives, while the 44-pin flat ribbon cable is used with 2.5-inch drives in laptop and notebook computers—with the extra four conductors supplying power to the drive.

18 Hard-Drive Controllers

Below are feature summaries of 18 hard-drive interfaces for the Amiga 2000, 3000, and 4000. Drives are presented in alphabetical order by the name of the developer. Benchmark-test comparisons for 13 of the drives are presented in the accompanying sidebar.

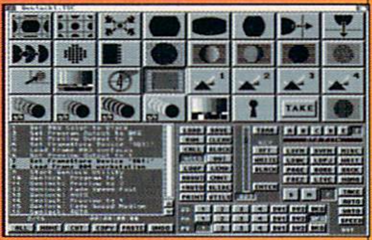
Advanced Systems & Software International Group

Fastlane Z3 ($599) is a full-length Zorro III combination card combining the functions of a fast SCSI-2 DMA host adapter and a memory-expansion card. It uses the standard 50-pin SCSI connector for its internal interface. Connection to external SCSI devices is via a 50-pin Centronics-style connector. The bulk of the card is occupied by 16 SIMM sockets that can accept 1MB or 4MB SIMMs. An optional upgrade kit converts the SIMM sockets for use with 4MB or 16MB ►

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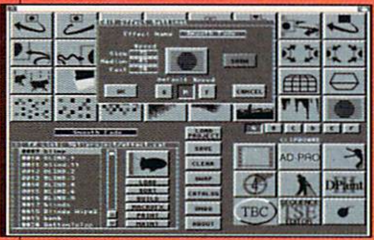
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System Requirements: Workbench 2 or higher, Video Toaster 2.0, 7MB or more of memory, 2MB of chip memory helpful. TRexx Professional and/or Toaster Toolkit helpful as well.

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System Requirements: Cocoon works on any Amiga with at least 3MB of RAM. 8MB are required to render high resolution morphs. Hard drive is required with less than 4MB, highly recommended otherwise. T5056

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SIMMs. The possible memory configurations using various combinations of 1MB or 4MB SIMMs in groups of four are 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 48, or 64 megabytes. Using the upgrade kit, you can install up to 256 megabytes of 32-bit RAM.

Fastlane Z3 accepts RAM chips with access speeds of 100, 80, 70, and 60 nanoseconds (ns). The 100ns option allows you to use existing SIMMs that you may have on hand, although operation with 100ns RAM will be relatively slow. With 60ns chips, RAM access time is about 95% that of the memory on the Amiga 4000's motherboard. Fastlane Z3 also has a jumper position for 40ns RAM but it is currently inactive. This option is in anticipation of future versions of the Su-

Hard-Drive Controller Benchmark Test Results

NOT UNEXPECTEDLY, the hard drive's capabilities have a significant impact on the overall system performance of the computer, SCSI host adapter and hard drive combination. For example, using Nic Wilson's Sysinfo version 3.14, I tested an Amiga 2000 equipped with a Commodore A2630 25MHz 68030-based accelerator, an IVS Grand Slam, and a selection of five hard drives. Using an aging, but still serviceable Quantum ProDrive 40S, the system's read speed was 765,000 bytes per second. Switching to a Syquest 88MB removable-media drive boosted the read speed to 940,000 bytes per second. Running from a Quantum LP105S resulted in a respectable transfer rate of 1,240,000 bytes per second. Next, hooking up a Quantum LPS120S nearly doubled the transfer rate to a very impressive 2,340,000 bytes

SysInfo V3.14

Testing system read speeds. All vaules represent multiples of 1000 bytes per second.

		A2000		A4000	
HOST ADAPTER	MANUFACTURER	LPS120S	LPS525S	LPS120S	LPS525S
A2091	CBM	1579		*	
A4091	CBM			2390	2902
AdSCSI 2000	ICD	1635	1659		
DataFlyer	Expansion Systems	1040			
FastCard Plus	Xetec	1078		822	820
Fastlane Z3	AS & S			2390	2890
G-Force 030	GVP	2241	2241		
G-Force 040	GVP	1900	1928		
Grand Slam	IVS	2340	2596	1618	1628
MiniFast Card	Xetec	1298			
Trifecta	ICD	2390	2881		
Vector	IVS	2390	2657		
WordSync	Supra	1287			

*** Although the A2091 was compatible with the A4000, performance was little better than with a floppy drive. There are some independently developed patches available on the networks that claim to work around the problem. I tried Giuliano C. Peritore's A4091PATCH Version 39.2 and Fabio Caruso's A2091Turbo V1.3 with inconclusive results. In view of the limtations, I felt that evaluation of the A2091 as an Amiga 4000 peripheral was unwarranted.**

MKSoft's DiskSpeed 4.2

Testing directory manipulation speed.
The number on the left is with a Quantum LPS120S drive. The number on the right is with a Quantum LPS525S drive.
All values represent files per second.

AMIGA 2000 HOST ADAPTER	MANUFACTURER	CREATE	OPEN	DIR. SCAN	DELETE	SEEK/READ
A2091	CBM	21/	45/	89/	74/	45/
AdSCSI 2000	ICD	164/142	202/207	596/565	342/352	55/66
DataFlyer	Expansion Systems	22/	90/	265/	153/	57/
FastCard Plus	Xetec	27/	146/	370/	266/	75/
G-Force 030	GVP	41/43	162/176	379/357	307/333	77/94
G-Force 040	GVP	39/42	123/186	268/300	250/299	71/120
Grand Slam	IVS	28/29	202/89	408/193	179/142	436/86
MiniFast Card	Xetec	27/	160/	382/	255/	79/
Trifecta	ICD	87/176	104/204	348/637	179/352	55/95
Vector	IVS	27/31	156/145	340/293	249/218	78/104
WordSync	Supra	19/	71/	274/	155/	53/

per Buster chip that will support faster RAM.

The Fastlane Z3 that I received appeared to be a production model and showed no evidence of jumpers or other post-assembly modifications. The installation software, which appears to be quiet versatile, was still in the pre-release stage. I used Commodore's HDToolBox to configure the system.

Commodore

When you buy a Commodore expansion board you can be sure of one thing: It will be fully supported by the operating system. In this case, the hard-drive preparation-and-set-up software, HDToolBox, is supplied with AmigaDOS 2.0 and higher. Place the program in the Tools directory using the standard ►

per second. Finally, hooking up to a Qunatum LPS525S increased read speeds to 2,595,000 bytes per second.

Performance tests were done using the Quantum LPS120S and the Quantum LPS525S as indicated. The LPS120S has a 17 ms average seek time. The LPS525S is a fast SCSI-2 drive with an average seek time of only 10 ms. The tests were run on an Amiga 2000 equipped with an A2630 25 MHz 68030-based accelerator equipped with 4MB of 32-bit RAM and 2MB of chip RAM. Of course, the A2630 was removed when the GVP G-Force and IVS Vector were evaluated. A second set of tests of the compatible host adapters was performed on an Amiga 4000/040 with 6MB of RAM. All values are in 1000 bytes per second.

MKSoft's DiskSpeed 4.2 (cont.)

AMIGA 4000

HOST ADAPTER	MANUFACTURER	CREATE	OPEN	DIR. SCAN	DELETE	SEEK/READ
A4091	CBM	50/51	95/113	272/272	207/196	68/99
Fastlane Z3	AS & S	51/54	100/101	391/359	187/216	79/119
Grand Slam	IVS	28/30	110/107	393/332	244/233	78/115

MKSoft's DiskSpeed 4.2

Testing with a 262,144 byte, MEMF_FAST, LONG-aligned buffer. All values represent mulitples of 1000 bytes per second. The number on the left is with a Quantum LPS120S drive.The number on the right is with a Quantum LPS525S drive.

AMIGA 2000

HOST ADAPTER	MANUFACTURER	CREATE	WRITE	READ
A2091	CBM	922/	1395/	1324/
AdSCSI 2000	ICD	1180/1233	1338/1311	1295/1471
DataFlyer	Expansion Systems	376/	495/	935/
FastCard Plus	Xetec	863/	1049/	994/
G-Force 030	GVP	1195/1517	1451/1792	1492/1896
G-Force 040	GVP	1298/1646	1618/1961	1709/1726
Grand Slam	IVS	1133/1137	1471/1483	1917/1905
MiniFast Card	Xetec	903/	1122/	1175/
Trifecta	ICD	1332/1954	1705/1959	1896/2353
Vector	IVS	1103/432	1265/1406	1671/2247
WordSync	Supra	794/	973/	1129/

AMIGA 4000

HOST ADAPTER	MANUFACTURER	CREATE	WRITE	READ
A4091	CBM	932/708	1314/2174	1879/2451
Fastlane Z3	AS & S	1134/643	1685/2182	1961/2451
Grand Slam	IVS	1115/1227	1451/1502	1447/1510

AmigaDOS installation routine. HDToolBox is used to set up both SCSI and IDE drives on the Amiga 4000. If you bought your system with the hard drive installed, it will have been formatted and partitioned by Commodore. If you are installing your own hard drive, you can use either the default installation routine or HDToolBox. The latter lets you select size partitions with either a fuel-gauge style drag bar or by direct entry of the start and end cylinders.

Two Commodore host adapters were evaluated for this article: the venerable but aging A2091 and the just-released A4091. The **A2091** ($199) is a full-length Zorro II expansion card that can be converted into a hardcard. Connection to external SCSI devices is via a 25-pin "D" connector. You can add memory to the A2091 by installing up to 16 256Kx4 DRAM chips in the empty sockets. The possible memory configurations are 512K, 1MB, and 2MB. Performance of the A2091 on the Amiga 2000 was good, although it initially balked at the LPS120S hard drive until I obtained an updated ROM from Quantum. It also refused to work with the LPS525S on the Amiga 2000. While, technically, the A2091 worked with the Amiga 4000, its performance was abysmal—with operating speed not much better than with a floppy drive. This is a known limitation of the A2091, as several patch programs designed to fix the problem can be found on the networks. Operation of these patch programs requires a large buffer in either the A2091's on-board RAM or in the system's chip RAM. Unless you already have an A2091 on hand, or until Commodore issues an official patch to eliminate the problem, I cannot recommend the interface for use with the A4000.

The **A4091** ($379) is a full-length Zorro III expansion card that can also be converted into a hardcard. Connection to external SCSI devices is via a high-density 50-pin "D" connector. The A4091 also features a hard-drive LED pass-through connector, which lets you use the A4000's front panel hard-drive LED for both the SCSI devices and the system's original IDE drive. The A4091 supports the SCSI Fast Bus as defined in the SCSI-2 standard. Its performance on the Amiga 4000 was excellent.

Expansion Systems

Expansion Systems' **DataFlyer 2000** ($99.95) is a half-length Zorro II expansion card that supports both SCSI and IDE hard drives. The package includes short lengths of 50-pin SCSI cable and 40-pin IDE cable. You can convert DataFlyer into a hardcard by mounting a hard drive to the back of the card, although doing so will obstruct the slot to the left of the card in the Amiga 2000. To connect external SCSI devices, simply install the optional 25-pin "D" connector and cable. DataFlyer's rigid-disk block format is not compatible with that used by the other host adapters. DataFlyer reserves the first four cylinders on the hard drive for its rigid-disk blocks. Hard drives that have been formatted with another host adapter can be mounted by DataFlyer with the provided DFMount program.

Great Valley Products

GVP's combination SCSI host adapter and RAM expansion board, the **A2000 HC8-II+**, ($199) was not available in time for this report. The expansion board is presently being revised for release as the **A4008** for the Amiga 4000. The A4008 should be available by the time you are reading this.

GVP did provide its pair of Amiga 2000 combination accelerator and SCSI host adapters. The **G-Force 030 Combo** is available in three configurations; GVP recently announced, however, that it will no longer manufacture its 25 MHz or 50 MHz '030 Combo boards. Therefore, for this article, I looked at the 40 MHz 68EC030 ($729), which was equipped with 4MB of permanently installed 32-bit RAM. All of the boards are equipped with three SIMM sockets that can accommodate up to 12 additional megabytes of 32-bit RAM. All memory configures in 32-bit memory space outside the range of the Amiga 2000's eight-megabyte RAM expansion area. You can convert the board into a hardcard by installing an optional mounting bracket. The internal SCSI connector is the standard 50-pin variety, while the external connector is the common 25-pin "D" type. The 68030 can be disabled and rebooted in 68000 mode under software control. Doing so disables access to the 32-bit RAM and the SCSI host adapter.

The **G-Force 040 Combo** ($1199) is based around a 33MHz 68040 microprocessor and it ships with 4MB of 32-bit RAM installed in one of its four SIMM sockets. A total of 16MB of RAM can be installed using 4MB SIMMs. You can expand RAM to 64MB by installing 16MB SIMMs instead. As with the 030 model, you can convert the board into a hardcard by installing an optional mounting bracket. The internal SCSI connector is the standard 50-pin variety. An external 25-pin "D" connector is mounted on a separate bracket. GVP provides mounting plates for installation in either the second coprocessor slot or behind a Zorro II slot. G-Force 040 Combo's rear mounting plate is equipped with a second parallel and serial port in addition to the Amiga 2000's built-in ports. The serial port is capable of data transfer rates as high as 625,000 bits per second.

ICD

ICD provided three products for this review. **AdIDE 2** ($79.95) is probably the smallest Amiga hard-drive interface ever made. The circuit board is barely large enough to accommodate its 64-pin socket for the 68000 microprocessor and the 44-pin connector for the IDE cable. Miniature surface-mount components are nestled between the twin rows of the microprocessor socket. Although it is possible to install AdIDE in an Amiga 2000, it was really intended for the Amiga 500; it can also be adapted for the Amiga 1000 and CDTV. Performance tests for AdIDE2 will be included in next month's roundup of Amiga 500/1000/CDTV products.

AdSCSI 2000 ($49.95) is a half-length Zorro II expansion card equipped with a removable mounting frame for installation as a hardcard. Connection to external SCSI devices is via a 25-pin "D" connector. **Trifecta 2000 LX** ($139.95) is a full-length Zorro II expansion card that can be converted into a hardcard by mounting a 3.5-inch or 2.5-inch hard drive on the back half of the card. Mounting holes are provided for both drive sizes. The LX version can interface to either SCSI or IDE hard drives. Both 44-pin IDE and 50-pin SCSI connectors are available

for internal drive connection. Connection to external SCSI devices is accomplished via a 25-pin "D" connector.

Trifecta EC was a lower-cost version of the LX for use with IDE hard drives only, but it has been phased out and the price of the LX is now the same as the EC's former price. You can upgrade the EC version to full LX functionality by installing two socketed chips. You can add memory to Trifecta by installing up to 16, 1MB×4 ZIP chips in the empty sockets. The possible memory configurations are two, four, six, or eight megabytes.

Interactive Video Systems

IVS has three offerings for the Amiga 2000 and two options for the Amiga 4000. **Trumpcard Professional** ($149) is a half-length Zorro II expansion card. In lieu of an external 25-pin "D" connector, it has a pair of standard 50-pin SCSI connectors. You can daisy-chain the SCSI devices from one connector or use both connectors if that is more convenient. IVS discourages the use of 25-pin cables with Trumpcard Professional because its SCSI bus operation is too fast. Hardcard assembly is available through the optional mounting rails. Trumpcard Professional provides SCSI ID selection jumpers, and its installation software supports SCSI networks with multiple host adapters. I have successfully networked an Amiga 2000 and an Amiga 500 with two hard drives using a Trumpcard Professional and a Grand Slam.

Grand Slam ($269) is also a half-length Zorro II expansion card based on the same SCSI host adapter as Trumpcard Professional. Grand Slam also offers eight SIMM sockets for up to eight megabytes of on-board 16-bit fast RAM and an extra parallel port. The latter is configured for output for use with a printer. The limitation of this design, though, is that the system cannot tell when a printer problem, such as being out of paper, occurs. Grand Slam's parallel port does, however, free up the Amiga's own parallel port for use with other peripherals such as a scanner or digitizer.

IVS's **Vector** ($799) provides a 68030 processor with a 68882 math coprocessor, a SCSI host adapter with both internal and external 50-pin SCSI connectors, a hardcard, on-board 32-bit RAM, and connectors for additional 32-bit RAM on an optional Commodore A2630-compatible add-on card. Vector sports a truly unique feature, called PRO-PLEX, that automatically reconfigures Vector's 32-bit SCSI host adapter and up to 8MB of its 32-bit RAM as 16-bit resources when the system is switched back to native 68000 mode. Vector also has eight SIMM sockets that can be populated with one- or four-megabyte SIMMs. Since SIMMs have to be added four at a time, the available combinations are 0, 4, 8, 16, or 32 megabytes. You can expand Vector's 32-bit RAM to 112MB by plugging a card, such as DKB Software's DKB 2632, into its A2630-compatible connectors.

Supra

Supra's **WordSync** ($129.95) is a half-length Zorro II expansion card equipped with a removable mounting frame for installation as a hardcard. Connection to external SCSI devices is via a 25 pin "D" connector.

Progressive Peripherals & Software

Progressive's **Zeus** board (from $895) provides a high-speed SCSI-2 controller, a 68040 accelerator, and sockets for up to 64MB of 32-bit RAM on a card designed for the A2000. Although we were not able to get hold of a board to run our speed trials, we did put the board through some paces in a recent review (see Sept. '93, p. 68). AIBB's MemTest rated a Zeus-equipped A2000 more than three times as fast as an A4000/040. Most other tests produced impressive results as well.

Pre'spect Technics

Pre'spect makes a line of SCSI controllers for various Amiga models, including two for use in A2000, A3000, and A4000 machines. The main difference between the **ALF3** ($195) and **Octagon 2008** ($205) boards is RAM; the former assumes your RAM is on another board while latter allows up to 8MB. As with Progressive's Zeus, we were not able to get our hands on either of these boards for testing.

Xetec

Xetec's **MiniFast Card** ($75) is a low-cost, no-frills, smaller-than-half-length Zorro II card. A Xetec MiniFast Card has provided me with two years of yeoman service as a second SCSI host adapter in my A2000 system—dealing with a Chinon CD-ROM drive and a Quantum LP52S hard drive dedicated to A-Max. Xetec's **FastCard Plus** ($150) is a full-length Zorro II expansion card that can be converted into a hardcard by mounting a 3.5-inch hard drive on the back half of the card. Connection to external SCSI devices is via a 25-pin "D" connector. Memory can be added by installing SIMMs in the four sockets on the board. Possible memory configurations are two or four megabytes with one-megabyte SIMMs and eight megabytes with a pair of four-megabyte SIMMs. I also tried out FastCard Plus on the A4000, but with limited success. The system locked up, preventing me from completing the performance tests.

PERFORMANCE POINTERS

Any of these systems do the job for which they were designed. If you already have RAM expansion, then a simple hard-drive interface may be all you need. The Trumpcard Professional and the AdSCSI 2000 offer good performance at a moderate price. Trifecta, on the other hand, provides excellent performance with both a SCSI and an IDE interface. Grand Slam also provides excellent performance and eight megabytes of RAM with an extra parallel port thrown in for good measure. If it is price and not performance that you are after, then the MiniFast Card or DataFlyer can do the job inexpensively. For the Amiga 4000, the A4091 looks like a winner, but it is definitely not cheap. Fastlane Z3 offers comparable performance and plenty of memory options, as well. Or, for a little less performance and a lot less investment, try a Trumpcard Professional in the Amiga 4000. The IVS products also give you the option of sharing SCSI peripherals with full SCSI network support. ■

*Morton A. Kevelson, an electrical engineer, is a frequent contributor to Amiga publications. Contact him at **AmigaWorld** Editorial, 80 Elm St., Peterborough, NH 03458.*

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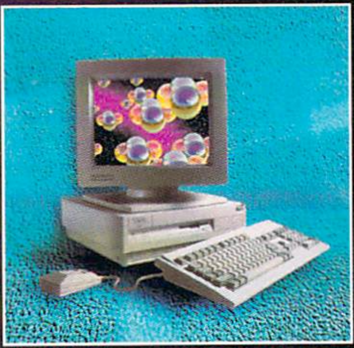
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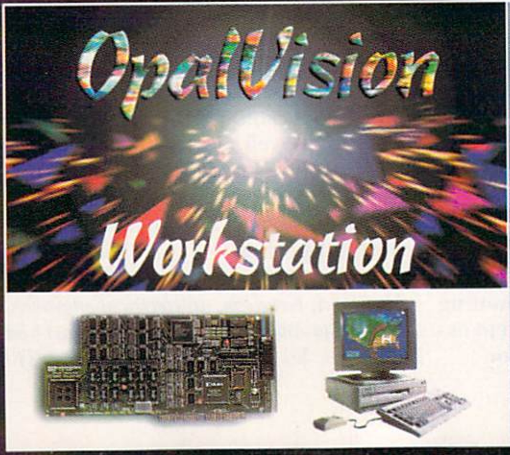
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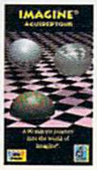
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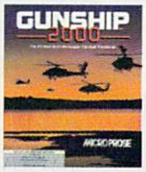
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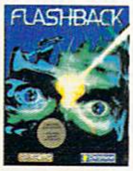


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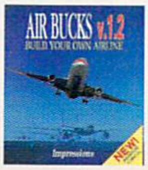


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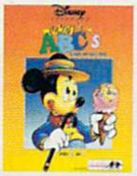
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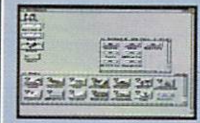


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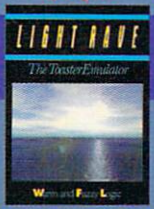


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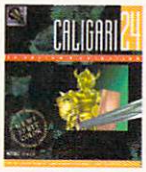
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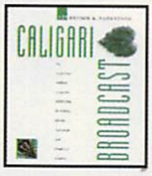
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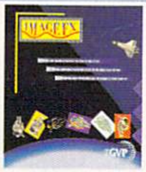


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Scanning ... By the Numbers

57

A continuing series of tips, techniques, and tricks for creating more imaginative Amiga graphics.

By Joel Hagen

AT FIRST, USING a scanner seems like the simplest thing in the world. You press a couple of buttons and crisp images appear on your screen. Later on, if you are like me, things become more and more puzzling. Strange patterns appear on some images but not others. Print jobs using your beautiful scans turn out awful. Service bureaus ask mystifying questions in acronyms about dpi, lpi, and ppi.

Even if you don't own a scanner, you may have access to one you can experiment with—even if it is not hooked to an Amiga. This column won't shed light on all aspects of scanning, but perhaps it can serve as a handy reference for some of the less intuitive issues.

A scanner operates by moving a sensor back and forth across an image. At regular intervals, the sensor evaluates the color or value of an area of that image, translates that information into numbers and saves those digits in a list that can be stored in the computer. Later, these digits will be used to define the color and value of each pixel on your computer screen, resulting in the display of a representation of the original image. That same digital information can also be included in a desktop-publishing document and sent to a printer.

Through software interfaces, you can exercise considerable control over the scanning process. Knowing what to control, however, can be confusing.

Decisions, Decisions...

Your primary decisions will involve stipulating the physical size and the resolution of the image area. The size can usually be adjusted manually by dragging a box around a preview of the image in the scanner. That size can be more accurately adjusted by entering width and height in pixels, inches, or centimeters. Resolution refers to the actual number of samples per inch the scanner makes and is expressed as a number usually between 50 and 600. Your intended use of an image will affect your decisions about size and resolution. Your computer's memory may limit your decisions.

If your scan will wind up in print, try to scan at dimensions at least equal in inches to the eventual printed size. Sometimes, for example with line art, you will get better results scanning at double the eventual printed size. We will look further at print decisions later when discussing resolution.

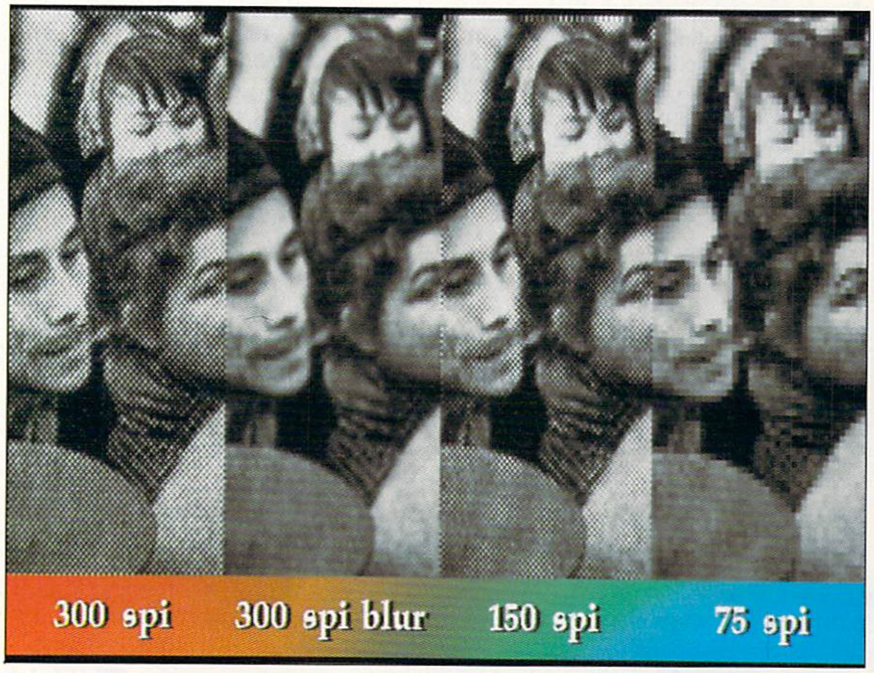
If your scan is intended for computer or video display, set the dimension in pixels. The scanner uses square sample points and thus produces an image assuming square pixels. Many computers use square pixels, but the Amiga has always been geared for video compatibility and uses non-square pixels suited to NTSC standards. Thus, a scanned image will usually appear vertically stretched on a standard Amiga or NTSC display.

If you want a scanned image to end up as a 640×400- or 736×480-pixel display for multimedia or video applications, plan ahead. Define a taller height when you scan, then shrink the image later to 85 or 90 percent of its original height. (Technically, 86% should be right, but monitor settings vary slightly.) To calculate the scanning height, divide the desired final height by .86 (or whatever percent suits your display). Thus, for a height of 400 pixels, 400 divided by .86 equals 465 pixels high at the scanner. Scale the captured image to 400 with Art Department Professional (ASDG), Imagemaster (Black Belt Systems), or ImageFX (GVP), all of which have direct interfaces to popular scanners such as the Epson ES series model that I used for the accompanying illustration.

Your other scanning decision involves choosing a sampling resolution, and this can hinge on many factors. If your image is destined for print, you should know something about how your image will be reproduced in order to make a good decision on scanning resolution. Much as the scanner ana-

Achieving good results with a scanner is no hit-or-miss proposition—as these insights on the process will clearly demonstrate.

lyzes an image by sampling so many squares per inch, so a printer reproduces an image by creating so many spots of ink per inch. The size of these spots creates the illusion of a range of grays or colors. This is called a halftone and can be seen in the high-resolution 300-spi (see below) scan in the illustration. The number of spots per inch is referred to as the screen frequency. Screen in this case refers to the grid of ink spots, not the computer screen. This is also called lines per inch, or lpi. Dots per inch, or dpi, refers to the actual dots of ink a printer uses to create a spot of a given size. While we're speaking in acronyms, ppi refers to pixels per inch on a computer display. The sample points per inch of a scanner is spi, although you will often see that figure also expressed as dpi.



The illustration above shows the effects of scanning a printed halftone at various resolutions. To avoid moire effects (center, right), the image is scanned at high resolution, blurred, and then scaled down (center, left).

Mathematical Solutions to Correct Resolution

The screen frequency, lpi, varies according to the nature of the print job. Newspapers use 60–85 lpi, Quick-print printers use 85–110, magazines 133–185, and art books 185–300. A 300-dpi laser printer defaults to about a 53–60 lpi halftone screen. If you are scanning an image to be halftoned, scan at a resolution double the intended screen frequency to get best results. Less resolution than that diminishes the quality of the final print, greater resolution is a waste of file size. A more precise, more complicated formula that takes into account printed size and original image size is this: Minimum scanning resolution equals final image height or width divided by original image height or width times screen frequency times two.

Another useful formula to add here allows you to calculate the number of gray levels a printer will reproduce at various screen frequencies. The typical output resolution of printers varies from 300 dpi for laser printers up to 2400 dpi for imagesetters. To calculate the number of possible gray levels, divide the printer's dpi by the intended screen frequency, then square the result and add one. If you are using images with 256 gray levels, here is a formula that will help you avoid losing gray levels: The output resolution must be equal to or greater than the screen frequency times 16.

If the image you are scanning is a magazine or newspaper halftone, there are additional considerations. The overlapping of the scanner's sample intervals with the regular pattern of ink spots can create an artificial pattern called a moire effect. This can be seen in the 150-spi scan in the illustration. Experiment with different spi rates to avoid this. One strategy, memory permitting, is to sample at 300 spi, blur the image slightly, and then scale it down (illustration, center/left).

Perhaps some of the guidelines mentioned here will help you make useful decisions at the scanner. It might be helpful to extract the formulas from this column and jot them down for reference as you try your experiments. ■

Joel Hagen's credits include work in art, astronomy, science fiction, and software development. Write to him at 10512 Sawyer, Oakdale, CA 95361. Please include a stamped, self-addressed envelope for a reply.

From p. 23.
jumper that you'll probably never use.)

Cramming In RAM

Why doesn't the RAM autoconfigure? Because while the M1230 XA's single SIMM socket supports up to 128MB of memory, the A1200's AutoConfig memory space is only 8MB, with 4MB of that unvailable if you use the PCMCIA slot. MicroBotics mapped the memory in 32-bit RAM expansion space, where there's no such limit, but Kickstart 3.0 won't recognize it, so a provided program, AutoXA, is needed to enable the RAM. MicroBotics claims that Kickstart 3.1 will automatically recognize the memory.

While at present you'll have a hard time finding a SIMM with 128MB of RAM on it, it's nice to know MicroBotics is thinking ahead.

The board's single SIMM slot supports single- and double-sided 32-bit, 72-pin SIMMs. It uses the same 1MB and 4MB SIMMs as the A4000, but also supports any other size up to 128MB. Don't plan any 64MB rendering projects soon, however: currently, only 16MB and smaller SIMMs are priced below stratospheric levels.

Although the board is available without RAM, you definitely want to add at least a little 32-bit memory; without 32-bit RAM, the 68030 barely affords any speedup at all.

Let 'er Rip!

Just how quick is MicroBotics' board? In two words, amazingly fast. Using AIBB 6.1 for test purposes, the 50-MHz 68030 on the M1230 XA actually surpassed the integer performance of the 25-MHz 68040 in my A4000 and was over 75 percent faster than an A3000/25 at number-crunching tasks.

Compared to a stock A1200 with no Fast RAM, the M1230 XA blew it out of the water, posting four-times quicker integer and almost twice the speed at graphics. Floating-point tests showed the 50-MHz 68882 averaged around half the speed of the A4000, still a respectable number when you consider that it's more than eight times the math performance of an unexpanded A1200.

You can get an additional speed boost—at the cost of 512K of Fast RAM—by using the 68030's MMU to map Kickstart into Fast memory with the CPU FASTROM command. The MMU also lets you use developer tools, such as Enforcer, and virtual memory programs like INOVAtronics' GigaMem, neither of which works on a basic A1200.

The less-expensive 40-MHz EC030 version of the board sacrifices only a little in the performance department, but it doesn't have an MMU. The 68030 can't be disabled, but that's not a big deal, as virtually everything that works on the stock 68EC020 accelerator in the A1200 works fine on a 68030 accelerator. There's a real-time clock chip that can be disabled if you already have one installed on your system.

The documentation is slim but complete, and MicroBotics offers first-rate online support on BIX and CompuServe. The board exhibits the high-quality construction that's been evident in MicroBotics products since the days of their A1000 Starboard. All that's missing is a SCSI controller option; if you're happy with an internal IDE hard drive, the M1230 XA may be all you need to turn your already quick A1200 into a low-budget rocket.

—Denny Atkin ►

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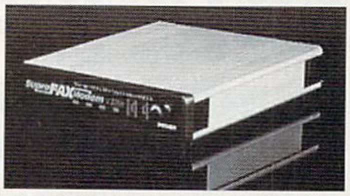
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BACKTALK

Candid responses to *Amigaworld* Product Coverage

Benchmark Corrections

MicroBotics' M1230 XA

Your article, "A1200 Expansion: Choosing the Right Path," (Sept. '93) features a table on page 24 that gives the aggregate results of AIBB 5.5 benchmark testing on various A1200 expansion boards and accelerators. The results reported for the MicroBotics M1230 XA accelerator are seriously in error and make the product look like a poor performer in comparison to other '030-based accelerators. This is a direct result of not running the AIBB test using XA's 32-bit memory. The reviewer claims the test would not run when XA's memory was configured, so the XA's reported results are based on using only slow, PCMCIA-based RAM.

MicroBotics actually uses AIBB to test XAs before shipping, and included AIBB 5.5 on the installation disk for review. In investigating why the reviewer couldn't run AIBB 5.5 on XA, we found that the returned review unit was incorrectly configured for eight megabytes of memory installed. When the unit was sent out for review (indeed the last step before shipping was to run AIBB 5.5 on the board), it was correctly configured to four megabytes. Naturally, this discrepancy would cause almost any program that used FastRAM to crash.

The improper use of XA's setup software to tell the system it had more memory than it actually did thus caused the failure. Further supporting this surmise is the statement in the article that "each system was configured with...8MB of 32-bit RAM on board."

In Table 1, below left, we show the results that are obtained when running a properly configured M1230 XA. Accurate AIBB load modules and benchmark information for the M1230 XA are available on the CompuServe and BIX networks as well as directly from MicroBotics.

Table 1. AIBB 5.5 Ratings.

	INTEGER	GRAPHICS	FLOATING POINT
A500	12.04	5.76	27.34
A2000	11.73	4.27	18.46
A3000	1.94	2.42	1.94
A4000	0.96	1.04	0.65

Redmond Simonsen
Vice-President
MicroBotics

CSA's 12 Gauge

In your article, "A1200 Expansion: Choosing the Right Path," three of the four benchmark numbers shown in the FP (floating point) column for the 12 Gauge appear to be a repeat of the numbers shown for the A1200 with only PCMCIA 4MB RAM. The numbers for CSA's 12 Gauge should read:

FP (floating point)	Compared to:
18.83	A2000 w/fast RAM
1.95	A3000 25MHz
0.65	A4000 25MHz

Allan G. Riker
President and Owner
Computer System Associates

AmigaWorld appreciates these responses to the article and regrets any confusion that the original test result numbers may have caused. We hope that these letters serve to clarify our readers' understanding of the capabilities and performance of the products mentioned. *—Eds.*



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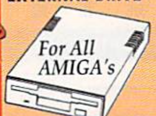
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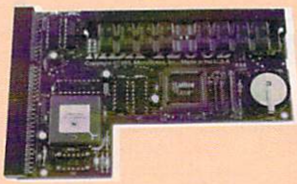
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The Game Preserve

By Peter Olafson, AW Games Editor

Dune II

A–
1.3 ✓
2.0 ✓
3.0 ✓
Hard-drive installable.
Off-disk copy-protection.

THE BOOKS WERE overdone and the movie was not fully baked, but ***Virgin*** seems to be cooking with gas in its Dune computer games.

The first Dune, a strategy/adventure, was a tribute to the classic beauty of simplicity. The follow-up, **Dune II: The Building of A Dynasty** (from the publisher's Westwood division), anchors a more sophisticated game mechanism to the same virtue.

It's a SimCity-like colony-builder with a basic but exhilarating point-and-click wargame—in the fashion of Caesar or Utopia, but with greater immediacy, play value, and terrific action. Damned if I didn't play it straight through to completion, just as I did with its predecessor—a luxury I don't often enjoy.

You use islands of rock in spice-planet Arrakis' sea of sand as the foundation for factories and installations of interwoven purpose. (The sand in between belongs to spice harvesters and the great worms that sometimes surface to swallow equipment.) Each scenario starts off with only a construction yard and a handful of defenders, but you can add wind traps (for power), radar (to widen your field of vision), spice refineries (to finance the whole operation), and more. Clicking on a building lets you access a production screen, to either make repairs or upgrade to build a better Ordos trap. (For instance, the Harkonnens have what amounts to a tactical nuclear weapon.)

Invariably, it's not long before a digitized voice—great use of this throughout—reports that enemy units are on the way, and here push comes to shove. (For my money, there's no single weapon so useful in defense as massed rocket turrets.) The firefights are great—fireballs erupting as projectiles hit home, missiles zigzagging crazily after airborne targets, and vehicles rambling all over town. And when a structure goes down, it does so with such stereophonic thunder that the very room ►



Mark your territory on the sandy planet of Arrakis in Dune II.

CRIB NOTES

Indiana Jones and the Fate of Atlantis

When last we visited with Indy and Sophia Hapgood—the principals of Indiana Jones and the Fate of Atlantis (*LucasArts*)—they'd just reached the decision point between the game's wits, team, or action paths. We'll take it from the top with wits, and return later to discuss the different approaches on the other paths.

You can explore Algiers if you like, but you can't do much there yet, so first head to Monte Carlo to find Alain Trottier. Trouble is, you haven't a notion what he looks like. Either hang around in search of someone who looks different from the other folks, or just do what you'd do in real life: Stop the people walking by and ask for directions, and eventually you'll hit on someone who knows of him. (Trottier's a distinguished gray-haired gent who favors brown and wears a flower in his lapel.)

Be sure to read the Lost Dialogue thoroughly before you start in with Trottier. He wants proof of your seriousness before he'll talk, and you'll need to answer his question (which varies from encounter to encounter) correctly. (Fortunately, he keeps walking by until you do.) Once that's done, he'll give you his business card. Cab it to the airport—there's nowhere else to go for now—and head for Algiers in search of Omar Al-Jabbar.

Lots of people in the streets here, too, and, save for the beggar (who doesn't come into play on this path), they're even less communicative than the ones in Monte Carlo.

However, it will take just a little walking and poking about to determine that Omar's shop is at the rear of the back alley at the far left. Omar's not here, but his officious servant Paul agrees to arrange a meeting once you produce Trottier's card. Well, he tries at least, but a thousand pardons, effendi: Omar cannot meet with you now.

A time-honored solution: Ask Paul to make your case to Omar again, and, this time, follow him. On second thought, maybe you should

Continued on p. 74.

A—Wow! Exquisite. A must for your games library.
B—Great fun. Plenty of entertainment value here.
C—Meets expectations. Good, solid, performer.
D—Disappointing. Lots of room for improvement.
F—A real stinker. Don't waste your time.
* You may encounter some problems under this operating system and/or require a PAL/NTSC adapter.

seems to shake. The satisfactions of a victory are such that you'll want to run and tell someone about it.

Technically, Dune II is OK. It runs at acceptable speed on a 500 under 1.3 and it runs, period, on AGA machines. It's next to indistinguishable from the IBM original (except it multitasks) and, as is common with high-quality IBM-to-Amiga conversions, has a sharp edge I don't recall in the original.

There are a number of minor but annoying gaffes, however. A hard disk is supported…and recommended to soak up the five game disks and preserve the player from a ton of swapping. But the installer has first to be copied to the appropriate HD drawer—a little fact that the docs manage to omit. The language used in the game is set at installation, but the installer nevertheless copies over the plentiful non-English files—not exactly an efficient use of space.

Finally, the saved-game-disk creator fails (at least under 2.04) to check the subsequently inserted floppy; hence, if your Disk One was write-protected, the program will read all floppies as write-protected.

I'd also love to take up some design issues with the developers. For one thing, the game struck me as on the small side. Playing as House Atreides—which I'm told has the toughest task of the three available houses—I took over the planet in about nine scenarios, and only the last proved really taxing. The enemy tends to think small, squandering its strength in small-scale rather than massed attacks, and not once taking the strategic initiative.

So, Dune II could use a data disk and a tweak or two. Still, it's wonderfully playable stuff, and splendidly converted to the Amiga. Bring on Dune III.

THE LOST VIKINGS

A
1.3 ✓
2.0 ✓
3.0 ✓
Hard-drive installable. No copy-protection.

WHAT INTERESTED ME initially about **The Lost Vikings** is where it comes from: the US. By rights, this splendid arcade/puzzler from ***Interplay*** (developed by Silicon & Synapse) should be the product of some clever-boots development house in the London burbs. It has the richness, the happily over-the-top quality, of European arcaders and the current fascination with rescuing helpless little critters. (Maybe Interplay's getting more than sales from its new English office, eh?)

TLV concerns the exploits of three Vikings who are...well, very lost...and in a distinctly non-Viking environment: alien spacecraft, galactic rifts, blue-dino inhabited countryside, that sort of thing. They work in concert and independently—you switch between them with a keypress—with the idea being to get them to the distant exit with their pitiful sup-

Continued on p. 78.

CRIB NOTES

From p. 72

just go back to Monte Carlo and make small talk with passers-by. In the overhead view, Paul's only semi-visible as a somewhat larger-than-usual white dot among dozens of other white dots roaming the streets.

But did you notice another colored dot in the streets? It's red, for the wearer's red fez. And, y'know, that might be just the thing to make Paul stand out from the crowd. However, you can't intercept the owner—a goofy, charming man—just anywhere. Wait until he's in the marketplace and then engage him in conversation. Keep the talk centered on his hat, concur when he suggests that you envy him, and the fez is yours.

Back in the alley, Paul will return from Omar's with another refusal. Ask him the price of pots, note his reply, and give him the fez. He won't go for it automatically—he's not the fez type—so use the clue from his response on the pots as persuasion. (For instance, if he says the pots are too small for someone of your stature, suggest the fez will make him look taller.) Now he's much easier to track, and while he'll lead you hither and yon, stay close, and you'll eventually spot him ducking into a house.

Omar really doesn't want to see you; he sends Paul for the cops and, much like Sternhart at Tikal, keeps following you around like a puppy to prevent you from laying hands on any of his belongings. Use this to your advantage. Lead him into the closet at the right rear of the room, then nip out and close the door, and you can search the place at your leisure while Omar howls obscure curses at you. (Do talk to him a bit, though, as he'll drop a few hints.) The two statues—the blackbird and the cheap soapstone carving—are nonessential, but can be useful a bit later in the game. Focus your attention on the laundry drying at the left rear. One piece is actually a map, which is essential, but out of reach. Use the bamboo stick in the jar in the foreground to knock it down, and use the camel to exit.

You're now a little humpbacked dot on the edge of the desert, which is big and mostly empty, but not quite empty. If you have Omar's map, nomads at the various encampments will help you get a bearing on the location of the "X." Their directions are deliberately cast in broad terms, but have specific meaning. (Hence, if they say the "X" is quite a distance east, that means a couple of screens.)

You may also have to deal with the foreign legion. Its members will try to intercept you and tell you to get your butt back to town, but they have about as many teeth as the UN on a good day, and you can just ignore them and keep exploring. Actually, you don't even need to deal with them at all, and should be able to steer around them. And if they stop you, you can sometimes bribe them to disappear using the statues from Omar's.

The dig is abandoned. The truck topside won't run—it needs a spark plug—and the dig itself is so dark that "touch" has replaced "look" in the command set. Nevertheless, you should be able feel your way around enough to collect a hose, pot (and the orichalcum bead within), and ship rib and locate the portable generator. It's out of gas, but I'll bet that truck still has some, and the pot and hose should work well as a siphon.

Ah, that's better. Now, have a good look around—particularly at the painting on the wall to the left. (The rib can be used to rub off the map on the right-hand wall, but, alas, it's unreadable; that ship rib must be a red-herring bone.) That ark certainly looks familiar, and could the stone disk the women are throwing be one Sophia was talking about earlier? Eh, could be, doc. Maybe you should try to manipulate it in some way. Well, now look at this: The ark opens to reveal a statue much like the one the German agent stole at the outset. Grab it, get the spark plug from the generator and get back topside.

The spark plug's a perfect fit, but the truck still needs a battery. Not a problem if you recall the earlier cut-scene animations in Sophia's dressing room and the Nazi lab: Those orichalcum beads can really put a tiger in your tank. Pop one into the statue and then use the statue on the engine, and you're on your way back to Monte Carlo.

Why Monte Carlo? Well, if you haven't already done so, look at the telegram in the truck. Trottier's being set up, and you have to warn him. He doesn't make you take a test this time, but is still a difficult soul, and you'll want to stay as close to the point as possible. He's still holding forth in stubborn fashion when guys in black suits lead him away. (This can't be avoided.) Rescuing him is actually pretty simple, however, as the Nazis drive around as though they're looking for an address. Just ram 'em with your car—repeatedly if need be. In gratitude, Trottier will direct you to the Greek island of Thera, and give you an idea at which Monte Carlo intersection he threw away his Sunstone key to Atlantis.

This location will vary from chase to chase, but the stone's always in a drain. This search can be time-consuming, but less so when you realize that the streets are laid out alphabetically (from west to east and south to north). You've just found one of the three stone keys to Atlantis!

Next time: Our traditional year-end cheats column. We'll take up with Indy again in January. □

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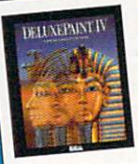
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From p. 74
plies of good health intact. With that accomplished, you're treated to a slash of insipid conversation among the three, handed a four-letter code, and booted into the next large level.

S&S has had inestimable good sense to name one of the Vikings Olaf the Stout. He's the one with the impenetrable shield-cum-parachute who looks like Kurt Cobain on a chocolate milk shake diet. Erik the Swift (a Norse take on Yosemite Sam) can run fast, jump where the others would fall, and head-butt his way through certain walls. And Baleog the Fierce is the weaponmaster who swings a sword and fires arrows to put down baddies and set off otherwise inaccessible buttons.

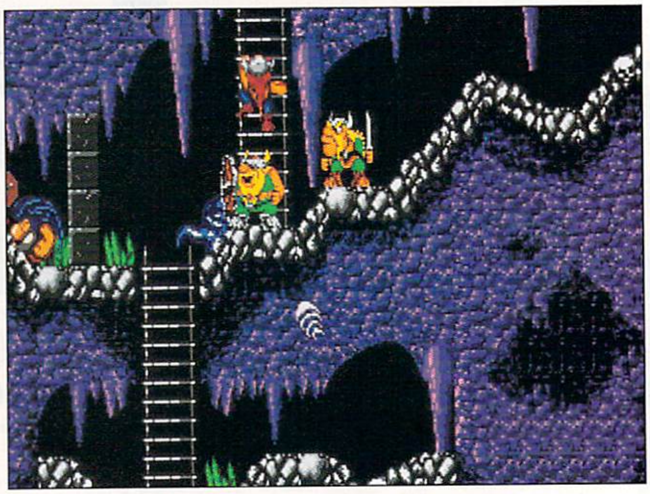
Otherwise, they're equals, able to pick up and use anything that fits in the separate, four-item inventories—ranging from colored keys to health-building munchies to kill-everything-in-sight specials.

It does sound a bit like a chip off the old Lemming, doesn't it? What sets it apart is a hefty platform-game element. TLV is in good part an arcader, with secret areas to be investigated, monster-butt to be kicked (with a nice little gravestone erupting from the ground afterward), ladders to be climbed, and crevices to be leapt over…or fallen into, as the case may be, if the leaper is something other than Erik.

The other big plus is personality. These squat little guys have a ton of it, and do not take readily to not being the active character.

In best console fashion, we're frequently treated to delightful minor animations—Erik huffing and puffing after exerting himself, Baleog showing off his muscles (on little or no excuse), and Olaf looking ludicrously joyful even when falling to his death.

Beyond that, TLV is a helpful game. The first few levels contain "?" boxes that provide hints and the opportunity to learn the game within the game. It's also very good about the level codes; even if you quit back to the main menu, the code for the last level is still displayed in the password slot, and the manual has a section for you to jot them down.



Guide your band of three out of the dark in The Lost Vikings.

This is a joy, pure and simple, and it was hard work finding anything to grouse about. Even my complaints, as such, are pretty wimpy. Considering that you can't complete a level without rescuing all three Vikings, it's notable that TLV doesn't include a quick-restore option after a single Viking dies; instead, you have to quit manually and sit through a funeral scene. A couple of effects come off as oddly simplistic in this otherwise lush environment. And there are just 37 levels, which doesn't seem like much compared to, say, Lemmings.

Then again, if you see this partly as a platform game, 37 levels is enormous. You'll treasure The Lost Vikings while you play it, you'll look forward to it when you're not, and you'll be sorry when it ends. I'm missing Olaf already.

SHORT TAKES

GOAL!

A
1.3 ✓
2.0 ✓
3.0 –
Not hard-drive installable.
No copy-protection.

They take their soccer very seriously in Europe, and their soccer computer games almost as seriously. "Footballers" are almost as common as Tetris clones over there, and games like KickOff II and Sensible Soccer have led a charmed life in overseas software charts.

Now those two have company, Goal! (*Virgin*; around $35), which takes a seat at the head of the table. From Dino Dini, creator of the KickOff line, it is simply the ultimate Amiga soccer game—wonderfully playable, full of features (but not burdened by them), and delightful to the eye and ear—from the revolving soccer-ball mouse pointer to the post-goal gymnastics.

Not surprisingly, at a basic level, it's generally reminiscent of Dini's KickOff games, with large-ish figures, engaging ease of play, and a high level of realism (penalties, injuries, and subs).

Outside the game proper, things have changed radically. In the options and edit menus, virtually everything is up for grabs, from the orientation of the field, the composition of the league, the game's scale, the wind, the color of the uniforms, and strategy. The game becomes what you want it to be.

Which is to say nothing of the savable replays and the crowd noise—the latter the best use of sound in a sports game since Earl Weaver Baseball. The only things missing are HD installability and support for 3.0. If you have any interest in soccer, get this. You can't do better.

Interesting Advertising-Invades-Amiga-Games note: Goal! is conspicuously "supported by" Adidas.

THE DIZZY COLLECTION

B+
1.3 ✓ *
2.0 ✓ *
3.0 ✓ *
Not hard-drive installable.
Copy-protection.

Who'd have imagined that a walking egg—much less one wearing bright red boxing gloves and sneakers—would take Europe by storm? Dizzy's string of budget arcade-adventures put the UK's *Codemasters* label (just beginning its assault on the US market) on the map, and they've generously collected five of them under one wrapper for $39.99: Fantasy World, Magicland Dizzy, Dizzy: Prince of the Yolkfolk, Kwik Snax, and Fast Food.

Yes, it's all rather twee and silly—and perhaps better for the young or young at heart—but I have a feeling you'll wind up playing this almost as much as the kids. It's very crisply presented, but the accent is on playability rather than huge production values. The levels are cleverly assembled, and the puzzles are tougher than you'd think. (Complaint: They've left out my favorite, Treasure Island Dizzy.)

And when you're tired of the adventures, there's always Kwik Snax and Fast Food (sliding-block and maze-game spin-offs). This egg isn't over easy. (Beware: Some of the games don't work under 2.0 and 3.0 systems.) ►

To locate vendors of the games reviewed, see the "Manufacturers'/Distributors' Addresses" list on p. 90.

BEAVERS

C — 1.3 ✓ 2.0 ✓ 3.0 ✓ — Not hard-drive installable. Copy-protection.

Cute computer-game critters are at a premium these days, and it's a wonder *Grandslam* didn't make better use of the beloved beaver in this one (around $35): No dam-building, tree-chewing, or tail-pounding that I could detect, but a good deal of mundane star-collecting, jumping over broken bridges, and so on in a boy beaver's search for his significant other. (She's been kidnapped by a rabbit with an automatic rifle.) This conventional-if-ludicrous platform game is no better or worse than loads of other games of this ilk—though it's more broadly drawn and difficult than most.

ANCIENT ART OF WAR IN THE SKIES

A — 1.3 ✓ 2.0 ✓ 3.0 ✓ — Hard-drive installable. Off-disk copy-protection.

Make fun, not war: That seems to have been the idea behind both Ancient Art and D-Day (see next review). These two wargame-lites take off in different directions, and are "do" and "don't" examples of the same task.

The "do" is most emphatically *MicroProse's* Ancient Art of War in the Skies (about $35)—a sort of distant cousin to Wings (minus the 3-D bits), in which you get to bomb installations, take part in dogfights, and run an air campaign against the insidious Hun in World War I. It's an enormous amount of simple but consistent fun—especially if you have a hard disk, which I can't urge upon you strongly enough. It's been keeping my 500 hot all week.

D-DAY

D — 1.3 ✓ 2.0 ✓ 3.0 ✓ — Not hard-drive installable. Copy-protection.

D-Day (*US Gold*; $40) is the WW II equivalent of Ancient Art and it's ...well, another matter. This concept had a lot of promise; the French developers behind it were responsible for the excellent sim-lites Advanced Destroyer Simulator and Sherman M4. But the execution of these four linked arcade segments—bomb runs, parachuting, tankers, and an infantry crawl—is decidedly off, and the game's a sort of a well-intentioned mess.

The tank game is a poor relation to Sherman M4, and it's downhill from there. The bombing game is smooth but simplistic, the parachuting game is even more basic, and the infantry game of hide and seek is positively pathetic. The four disks don't run from hard disk, and the game doesn't even support a second floppy, which makes it...well, less than happy-fun-time.

SUBVERSION 1.0

B — 1.3 ✓ 2.0 ✓ 3.0 ✓ — Hard-drive installable. Off-disk copy-protection.

A pleasant and speedy little war game (*Point of View Computing*; $59.95). You're captain of the submarine Nautilus in charge of wiping out the enemy in the Euclidean Strait.

But it's not a submarine game. The overhead perspective put me more in mind of a high-calorie version of Battleship. It has a friendly simplicity and you'll find it easy to come to grips with the clickable commonsense commands down the right margin. Yet there's also a decent amount of complexity and strategy, what with supply ships (yours), sharks, repairs, depth charges, and so forth. You can knock off a quick game, but it may be a while before you win one. (There are 99 "simulator" missions and more than 320,000 random ones.) Unfortunately, SubVersion has one of the most annoying copy-protection schemes I've seen this year—a codewheel, but a somewhat complex one that's invoked every time you play a new mission. That always made me think twice before reaching for the game. ■

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HELP KEY

This month: Tough video questions, PC talk, and more tales of CD-ROM woes.

By Tim Walsh

Sound Advice

Q. *I'd like to be able to use an Amiga to record and edit 16-bit stereo sound, handle 24-bit graphics, and perform minor video work, such as titling for home videos. I'd also like to have an Amiga with PC-compatibility.*

I currently own an Amiga 500 with a hard drive and 8MB of RAM. Given my desires for upgrading, should I consider a new Amiga or a PC-compatible?

Shawn T. Hooper
Pfafftown, North Carolina

A. Let's briefly address each of your points and look at a few Amiga options.

For recording and editing 16-bit stereo sound, options abound, but nearly all require the use of a 16-bit compatible sound card or device for the Amiga. MicroDeal's Clarity 16 device sounds (no pun intended) like a low cost solution to your needs. Because it's an external device, a Zorro slot is not required, which means it is compatible with all Amigas, including your A500. If you upgrade to another Amiga, you may want to consider a 16-bit sound board, such as SunRize Industries' true 16-bit AD516 board ($1495).

For 24-bit graphics and minor video work an ideal choice is to ugrade to an A4000. For starters, a good viewer program, such as the freely distributable ViewTek 1.5, allows you to display nearly all popular graphics formats on a stock A4000. To get creative with those images consider packages such as Art Department Professional ($299, ASDG), ImageFX ($429, Great Valley Products) and Imagemaster ($199, Black Belt Systems).

You may want to consider a simple video titling package, but, after the upgrade, you will want more video flexibility, GVP's IV24 2.0 ($1399), Centaur's OpalVision ($995) and the Video Toaster 4000 ($2395) from NewTek all easily justify the higher price ticket with their exhaustive lists of video options.

If you're interested in 24-bit graphic boards, see "Devices and Desires" (February '93) and the reviews of the Retina ($599) and the V-Lab ($499) from MacroSystems US (July '93).

Third-party devices and emulation programs for PC-compatibility already exist for your A500. "The PC Connection" (July, '93) gives a comprehensive look at PC boards for all Amiga models. AmigaDOS 3.0 on the new AGA Amigas lets your Amiga-specific applications read and write to PC-formatted disks. For true PC-emulation on the A2000, A3000, and A4000 you might consider one of Commodore's Bridgeboards, such as the recently discontinued A2286 (still available through some dealers) or the A2386SX Bridgeboard ($649).

Word On Video

Q. *I recently bought an Amiga 2000, installed AmigaDOS 2.1, and now I'm ready to start video productions and word processing on it. What do I need to get started?*

Slake Aronorade
Chicago, Illinois

A. I'll keep this simple. For video work, begin by reading the answers to the preceding questions. If you're working with live or recorded video and you're in need of the ultimate video switcher, NewTek's Toaster 4000 is the clear choice. It's also the one you want for its LightWave 3.0 if 3-D rendering and animation lies in your future.

When it comes to paint programs, OpalPaint, bundled with the OpalVision board, has won the greatest acclaim. Finally, for video work with an emphasis on multimedia, GVP's IV24 2.0, with its built-in framegrabber, video genlocks, and unique picture-in-picture capability, is not to be overlooked.

Some option-laden word processing packages are ProWrite 3.3 ($99.95, New Horizons), Final Copy II from Softwood ($99.95), and, to a lesser extent, Gold Disk's Transwrite ($37.97).

Pencil It In

Q. *When I try to connect my new A570 CD-ROM drive to the pass-thru connector on my external Supra RAM 500 RX, I sometimes get a Guru message on my Amiga 500. If I place a pencil beneath the computer and RAM expander, all's well. If I can get this combination to work properly, is there a way to effectively record from music CDs to computer disks?*

Chris Plath
Granby, Massachusetts

A. There are two potential trouble spots that immediately spring to my mind regarding the bad connection. Either the edge connectors on the Supra RAM expander or those on the A500 could be worn out or just plain loose.

Prevention is the best medicine. Daisy-chaining multiple devices to the A500's expansion port is seldom recommended. Even the minute jarring that occurs when typing rapidly is enough to gradually loosen the connections. Troubleshoot the cause by connecting the A570 directly to the A500. If everything functions fine, you may want to upgrade the A570's RAM and use the A500's expansion bay instead of the expansion port.

Using an eight-bit sound device, such as GVP's DSS8+ ($99) which accepts any output directly from line-level sound sources, you'll end up with 8SVX/IFF-format sound samples. Another, more versatile option is to send the output to a MIDI-compatible device. Any Amiga sound device with MIDI support can then receive, manipulate, and save those samples.

Finally, for A2000s, A3000s, and A4000s, Blue Ribbon Soundworks' One-Stop Music Shop ($649) can capture sounds originating from multiple sources to disk via presets. ■

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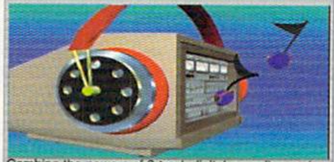


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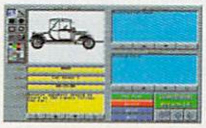
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Includes all of the above except Contractor's Upgrade and Library 1. AmigaDOS 2 comptible. With 2 disk drives, requires 1MB, with hard drive, requires 1.5MB. Original List price: $249. Product code: T4002

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Version 2

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*S-VGA graphics requires an AGA Amiga.

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True BASIC 2.0, Student Edition

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Student Edition Highlights:

- you can run TrueBASIC programs of *any* size
- Modern structured format allows you to combine smaller program sections into larger, sophisticated programs
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An amazingly powerful program at an unbeatable price, **OctaMED Pro 5** *features:*

- 8 channels of audio using the Amiga's own built-in audio hardware
- Handles ~~16~~ **64** MIDI channels for even larger orchestration!
- Includes it's own powerful sampling software to create your own instruments!
- ***Has standard music notation display mode!*** Compose & edit using tracker or stave formats
- **Online Help** - just tap the [HELP] key, and up pops a *complete* on-line hypertext manual with full cross-referencing and indexing!! Nothing short of a revolution in software documentation!
- Improved control over sampler and sample editor effects: The pitch changer has optional anti-aliasing, the volume boost has an optional 100 per cent limiter to avoid distortion, the filter has a further adjustable paramater, and the mix function allows for alteration of the relative volumes of the two sounds, unused space can be removed from the start or end of a sample, and looping controls are easier to use then ever.
- Redefinable keys and mouse buttons!
- Generic Slide function
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Product Code: T4035

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Features: Picture, IFF sound and a separate text file can be keyed to any question. When picture or sound is keyed to a question, an appropriate "button" lights up alerting user. Test Mode and Tutorial Mode. Score: number of questions missed and correct is tallied and displayed on the screen each time a question is answered. Will give customized sound feedback indicating a correct or wrong choice. Easy-to-use test maker is a separate program from the testing software. Several sample tests included. Easy-to-use mouse interface. Supports all current AmigaDOS versions.

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NOTE: The 2.05 ROM (above) is the latest 2.0 version, first released in Europe and then in the U.S. The new 2.05 ROM does everything the 2.04 does, plus it has such new enhancements as library upgrades, etc.

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MegAChip 2000 (with 2 MB Agnus installed + $30 worth of free bonuses for a total package price of $196.50

NOTICE: The Goliath chip puller/diagnostic software is available exclusively from Grapevine. Buy the MegAChip from us and we'll give you the new 8373 Super Denise (ECS) for $23.50 We will beat any legitimate advertised price!

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- **1571** Commodore floppy service manual **$17.95**
- **A500** Amiga computer service manual **$17.95**
- **A2000** Amiga service manual...................... **$22.50**
- **A3000** Amiga service manual...................... **$44.95**
- **A4000** Amiga service manual...................... **$34.95**
- **Call for other service manuals**
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COMMODORE FACTORY SURPLUS

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Recently, Commodore elected to consolidate their stateside operations, thus making them financially stroonger. One of the first steps taken was to reduce their inventory in both the U.S. and Canada. In doing this, select distributors were given the opportunity to purchase sizable amounts of new and factory refurbished parts at extraordinarily low prices. This section contains new and refurbished *items, which are indicated by the letters "N" or "R" to the left of each product.*
used or pre-owned, but simply factory remanufactured. Some units may have minor imperfections hardly noticeable or, in the case of some monitors, faulty front doors. With the exception of a minor imperfection, if any, most everything appears "mint" and of course everything carries a full 90 day warranty and some items a full year. This is your opportunity to purchase Amiga/Commodore parts and equipment at up to 80% less than an authorized dealer pays.

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- R **1403** composite high resolution monochrome video with cable **$49.95**
- R **1930** Bisync high resolution VGA color monitor (dot pitch .29). This companion to Commodore's PC series works with IBM/IBM compatibles **$99.95**
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- N **Amiga 500** with power supply and software **$169.95**
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- R **PC20III (XT)** 20 meg hard drive **$169.00**
- R **PC30III (AT-286)** 20 meg hard drive **$229.00**
- R **PC40III (AT-286)** 40 meg hard drive **$299.95**

ADDITIONAL OPTIONS

Amiga 1930 VGA Bisync color monitor with any of the "PC Series" computer add **$79.95**
Commodore 1084S with any "PC Series" computer add **$89.95**

SPECIAL PACKAGE PRICES

BONUS PACKAGE A:
Commodore C64 with 1541 floppy drive and 1084S (stereo) high resolution color monitor. Includes power supply and cables **$229.95**

BONUS PACKAGE B:
Commodore C64C (latest version made) with 1571 high density floppy drive and 1084S color monitor. Includes power supply and cables **$299.95**

BONUS PACKAGE C:
Amiga A500 computer with Software Starter Kit and 1084S (stereo) /2002 high resolution RGB color monitor. Includes power supply and cables (List price of package $449.00) Our price **$284.95**

MISCELLANEOUS

- N **A10** Commodore computer speakers with built in amplifier **$19.95**
- N **MPS1230** Commodore printer (same as Citizen 120) tractor/friction ... **$59.95**
- R **A2300** Genlock Board (A2000/A3000) Selling fast **$64.50**
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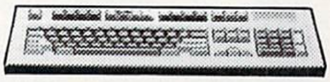
- N **3½" (720K) Commodore diskette** with various software that can be erased. This is a new disk available at a low price.
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- N **A500** (rev. 3) Complete with all chips including ½ meg Agnus/1.2 ...... **$89.95**
- N **A500** (revision 5 and up) Includes 8372 1 meg Agnus & 1.3 ROM **$129.95**
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- N **A2058** Commodore A2000 8K RAM expander (2MB) **$149.50**
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- N **A3000** daughter (Zorro) board **$84.50**
- N **VGA 286** laptop motherboard by Commodore **$179.95**
- R **1541** replacement control board only **$30.00**
- N **1571** control motherboard **$54.95**
- R **C64** motherboard (1984-7 version) **$29.95**
- N **C64C** motherboard (revision E) **$54.50**
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- N **C128D** motherboard (with new ROMs) **$94.50**
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- N **A600/1200** **$29.50**
- R **A1000** **$54.50**
- N **A2000** **$49.50**
- R **A3000** **$49.95**
- N **C64** **$15.95**
- R **C128D** **$25.95**
- N **PC Series** **$49.95**
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Dallas, TX 75204
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67380 Lingolsheim, France
33-88769426

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ASDG
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Madison, WI 53713
608/273-6585

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L8K 5W4 Canada
905/578-4916

Black Belt Systems
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406/367-5513

Caligari
1955 Landings Drive
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Centaur Development
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Redondo Beach, CA 90278
310/542-2226

Codemasters
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Commodore Business Machines
1200 Wilson Drive
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407/539-0752

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716/782-2468

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London, Ontario
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Oklahoma City, OK 73114
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Will Vinton Productions
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Portland, OR 97210
503/225-1130

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2804 Arnold Rd.
Salina, KS 67401
913/827-0685

AW Shucks!

We transposed the last two digits of Silicon Prarie's phone number in our last issue. The correct number is 306/352-0358.

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GVP PHONE PAK	C10989	299.99
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3.5" EXTERNAL FLOPPY DRIVE.		
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2000 Memory/Accelerators

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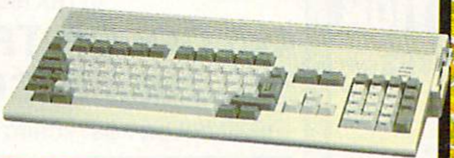
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THE LAST WORD

Kudos, complaints, comments, concerns, and contributions from our readers.

It's a Small World

I have been a subscriber to *Amiga-World* for a number of years now and have become increasingly disappointed in it. There is no question that the Amiga shines brightest in the area of graphics, and its audio capabilities are second to none. However, these are not the only areas in which people find the need of a computer.

Until recently I owned an A500. More than anything else I used it for data management, word processing, and games. Then the A1200 came out and I bought one. Now I find that my database is not 100% compatible with Workbench 3.0, so I am in the market for a new database program. Can I expect any help from AmigaWorld in choosing a program that will fit my needs? Of course not. Unless there happens to be an animated database available!

The name of your magazine is *Amiga-World*, but you cover only a portion of that world. I agree that the largest portion of *AmigaWorld* should be devoted to graphics, audio, and games. Actually, if you divided *AmigaWorld* into different sections, the size of which was based on reader usage, your largest section would be devoted to games and I'm sure there would be a few pages devoted to the review of and help with programs such as word processors and databases.

Fred Mason
Mountain Home, Arkansas

Put On Hold

I purchased an Amiga 1200 in early April and I am supposed to receive Commodore's offer of a free start-up package of software. I've written to Commodore and have called them about five times with no result. They keep telling me it is on back-order or is now being shipped. I am wondering if anyone else is having this problem. I enjoy your magazine very much, please keep it coming! I especially enjoy the Accent on Graphics column because I use DPaint a lot.

Dolores Busse
Omro, Wisconsin

Freedom of Speech

I would like to urge software developers to produce voice recognition software for the Amiga. Ideally, it would be capable of speaker-independent continuous speech-recognition. Even a program to operate other programs through voice commands would be welcome, especially to disabled individuals. It seems natural that the Amiga should be supported by a capable speech recognition system.

Tim Hodgins
New Brunswick, Canada

The name of your magazine is AmigaWorld, *but you only cover a portion of that world.*

Article Afterthoughts

In response to my recent look at printers, "Getting So Much Better All the Time!" (Sept. '93), John Covington of Rockingham, North Carolina wrote regarding his Hewlett-Packard Deskjet 550C. He enclosed some stunning printouts that are on par with the Canon Bubblejet 800, a printer that I had given somewhat higher grades. What is his secret to great-looking output? He used 20-pound, 25% cotton paper. Thanks, John. Your experimentation certainly paid off.

In another article, "The PC Connection" (July '93), I indicated that Vortex bridgeboards are Janus compatible. My shorthand was misleading, but I want everyone to understand this important feature. The Vortex boards can read virtual-drive files on a hard disk created by Commodore's bridgeboard. This means, among other things, that if you upgrade to a Vortex board, you can temporarily create a D drive from the old Janus file and then copy the contents directly through DOS to a more efficient C drive partition.

Dave Johnson
AmigaWorld

Game Pointers

In regards to Mr. Olafson's review of The Lavandiss RPGS (Aug. '93), I would like to point out that it is in fact not copy protected and may be redistributed. Also, the game is priced according to current PD prices per disk, plus manuals. The current version of Lavandiss is now being sent to several PD dealers who may distribute it at their own discretion with manuals available from The Software Studio.

Brian Matthew
The Software Studio

Staying Power

All I really want to say is keep up the awesome work. Today I got a letter from *Compute Magazine* informing me that it was dropping the Amiga section altogether; the whole magazine used to be Amiga, not just a few pages of complaining articles. *AW* has been through thick and thin, and kept its subscribers informed with top notch aritcles and reviews. Thank you for being there and stay loyal to the Amiga audience.

Ben Kizen
Boone, North Caronlina ■

MacroSystemUS

P R E S E N T S

RETINA

AGA Emulation on an Amiga 2000/3000!

Now with the new RetinaAGA real time AGA chipset emulator you get the features of the A4000. This means you can have a 256 color Workbench and run AGA programs on your A2000 or 3000. So don't try to guess what the AGA machines look like, find out for yourself with a RetinaAGA for a whole lot less!

The Retina is the first single card solution integrating the best features of the Amiga's graphical user interface with the ability to display **Workbench or AmigaOS compliant programs (on their own custom screen) in resolutions up to 1280x1024.**

- XIPaint real-time 24Bit paint program comes with the Retina™
- The Retina™ can still be used to display 24Bit graphics while displaying Workbench.
- **Retina animation software included to make 8, 16 or 24 Bit animations.**

Just some of the many packages supporting the "Retina" are ADPro, Aladdin 4D, MorphPlus, MultiFrame-ADPro, ProPage, Pagestream, Prowrite, Imagine2.0, TVPaint2.0 Professional, Dynacadd, Panorama, Real 3D 2.0 and our own VLab.

- Requires VGA and up monitors.
- Ram Configurations 2 MB or 4 MB.
- Compatible with the A2000, A3000, and A4000 series Amigas. Installs into any 100 pin Amiga slot **does not use the video slot.**
- Compatible with the **Video Toaster and OpalVision.**

Requires the 2.0 or greater operating system.

TVPaint 2.0 Professional

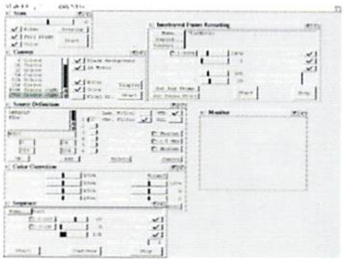
The State of the Art in 24Bit Painting for the Amiga. TVPaint is the fastest 24Bit Paint Package available for the Amiga.

Some of TVPaint's features: Automatic Antialiasing on drawing tools, Powerful Airbrush tools, Density control on tools, Full Undo/Redo, Spare/Swap screens, Convolution Effects, Definable Magnification Window, Custom Masks, Pressure Sensitive Tablet support, Color Lookup Tables. **Recommended by NewTek for use with the Video Toaster System.**

Retina Version	Suggested List	$599.95
Multiple Version	Suggested List	$799.95

VLab Y/C

New IFR - Digitize 30 FPS video from video tape!



The VLab includes an extensive software control system designed to make digitizing as easy as possible. For the first time building lengthy digital video segments no longer requires expensive and slow frame-by-frame digitizing. Using a revolutionary new concept, MacroSystem has provided a new Interleaved Frame Recording feature (VLab and VLab Y/C). **Interleaved Frame Recording or IFR basically allows the VLab to digitize full 30fps digital video sequences to HardDisk by making multiple passes of the recorded video.** The VLab will digitize the number of frames specified to either HardDisk or Ram as sequentially numbered frames.

Hardware Features

- Frame grab in 1/30th sec. or Field grab in 1/60th sec.
- Digitizes full frame full color - NTSC or PAL signals.

Software selectable inputs include:

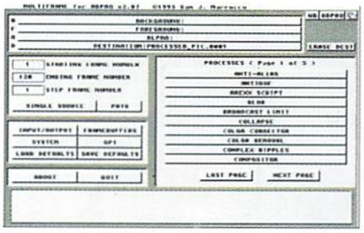
- VLab - 2 Composite inputs.
- VLab Y/C - 1 Y/C & 2 Composite inputs.
- VLab 1200 - 2 Composite inputs.
- **Time Base Corrector not required.**
- Compatible with the **Video Toaster and OpalVision.**

Software Support

- VLab control windows allow you to keep multiple critical controls open at the same time. And the monitor window display lets you see exactly what you are digitizing.
- Real time Color, Contrast, Luminance and Gamma, Luminance, Chromanace controls.
- **AGA chip set support.**
- **Includes ADPro Loader module.**
- Extensive ARexx control system.
- Save images in 24Bit, YUV, or AGA.
- The VLab™ is supported by many popular Graphics programs.
- Supported by the Nucleas Personal SFC.
- The VLab™ requires Kickstart 2.0.

MultiFrame - ADPro

According to Matt Drabick, of AVideo magazine "MultiFrame is a must for Amiga video users who always wanted to apply special effects to their animations using ADPro and MorphPlus but never had the time to learn how to write and execute ARexx scripts."



MultiFrame is a front end for the Art Department Professional and Morph Plus that gives you much greater control over multiple-frame processing with no knowledge of ARexx required. You can manipulate single or multiple images over time creating special effects easily. **The perfect tool for creating effects with a large number of images for output to video.**

MultiFrame Features:

- **Process images over time** - most processes can be manipulated with a starting value and an ending value with the separation being the number of frames that you choose to make. **Generates all frames automatically for you.**
- **Non-linear motion** using true splines with adjustable knots, tension, continuity and bias. Full spline- controlled variables.
- **Perform ADO-style fly-ins** of moving images easily using perspective operator. Create panning/tilting camera effects on still images or sequences.
- **Multiple frame/Multiple Ripples,** allowing ripples that start on different frames that accelerate/decelerate over time.
- **Rotoscope:** Automatic compositing of foreground images over backgrounds using true alpha-channel/holecutter/key effects.
- Automatic scaling and conversion of images during processing.
- Auto-Display of images to supported framebuffers (Retina, Firecracker, OpalVision, Harlequin, DCTV).
- Complex operator/processes (sphere, perspective, etc...) now allow loading and saving of all parameters for easy recall.
- **Automatic conversion** of any supported image format to any other format (including ANIM-5/ANIM-8 and **Toaster FRAMESTORE**) during processing.

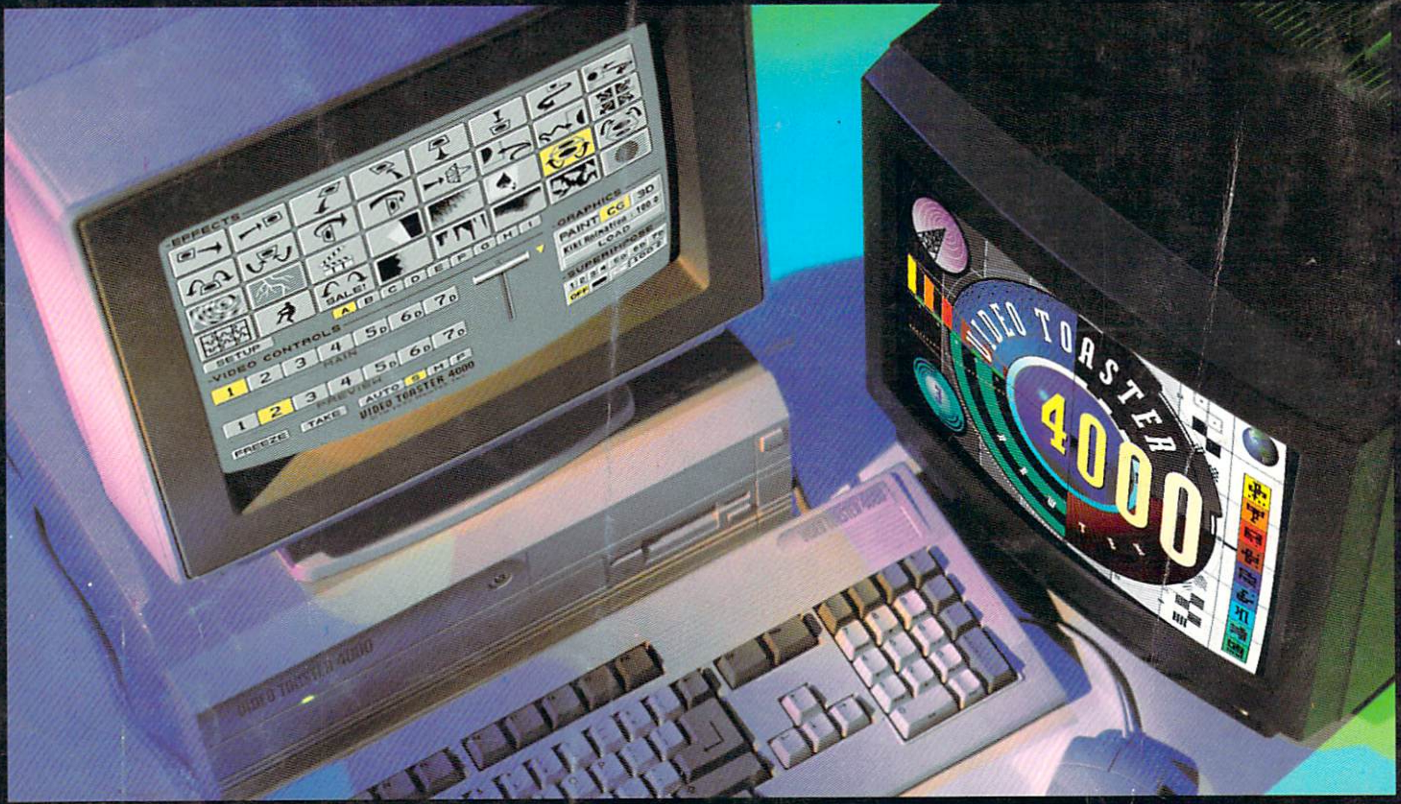
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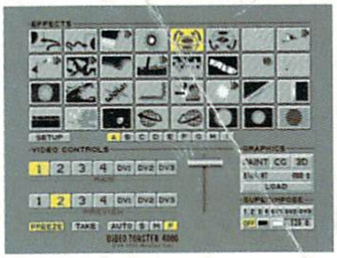
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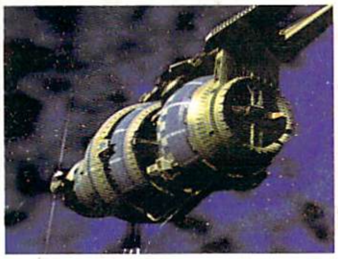
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